IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication OCTOBER 13, 1960

★ Special Report from Detroit:

Automakers Explore New Materials Trends p. 45

Report on German Tool Show p. 48

Fluid Bed: New Way to Heat Treat p. 81

Digest of the Week p. 2-3

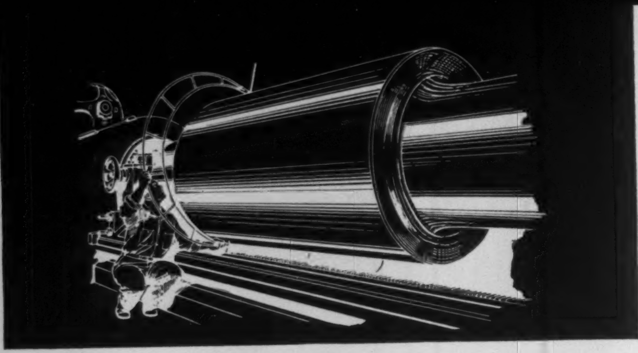
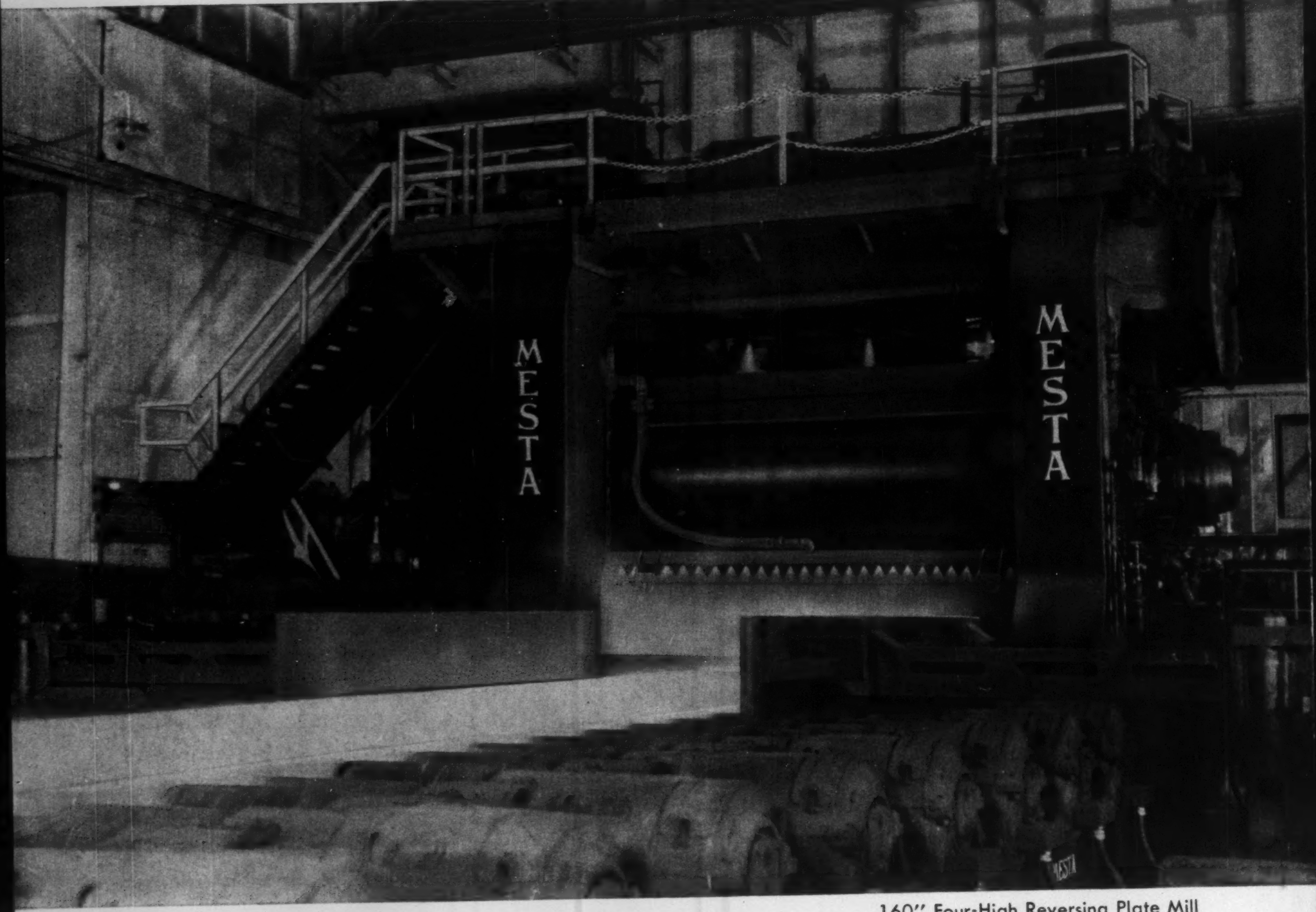


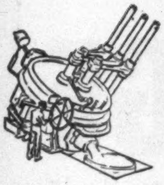
PLATE MILLS *designed and built by* MESTA



160" Four-High Reversing Plate Mill

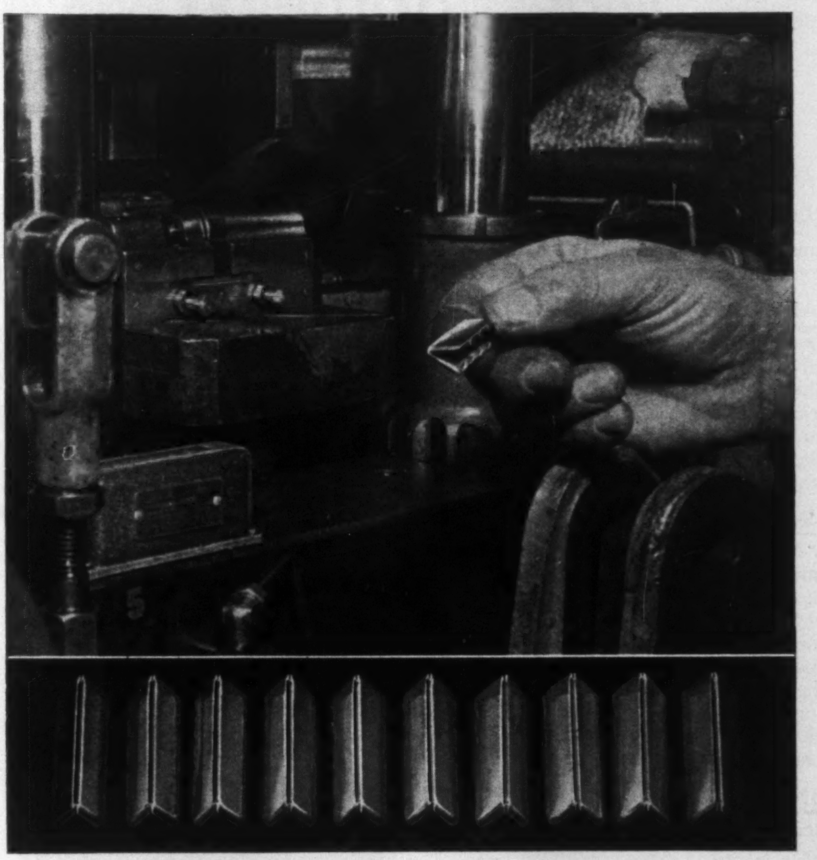
MESTA *Machine Company*
Pittsburgh, Penna.

MESTA
DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS



Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation



Lehigh H blanks and forms 1,000,000 pieces before redressing is necessary

Using a die of Bethlehem Lehigh H tool steel, Sobel Metal Products Co., Easton, Pa., produced this nickel-silver belt accessory, of the type used with army uniforms, at the rate of about 1,000,000 pieces before redressing was necessary. Blanking and forming .020-in. metal, the die was hardened to Rockwell C60-61. One of the requirements of the order was that no marking was permitted on the finished part.

Lehigh H (AISI D-2) is excellent tool steel for jobs like this. Not only is it the leader in machinability among the high-carbon, high-chromium tool steels sold today—it also has improved wear-resistance because its vanadium content has been increased to 1 pct.

As the result of a new manufacturing process, Lehigh H has improved carbide distribution and increased center density. It also has minimum distortion during heat-treatment.

If you want unexcelled machinability, excellent wear-resistance, and plenty of dependability, Lehigh H is your answer. See your Bethlehem tool steel distributor for prompt delivery.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Blind Holes Can Cause Plenty of Trouble

Unless one uses great care, blind holes can cause a lot of trouble when heat-treating tools. Holes for studs or dowel pins are typical of the blind holes which, as a rule, are paid little attention. Exposing blind holes to liquid quenching produces extremely high internal stresses, which can lead to cracking of the tool, either during heat-treatment or in service.

If it is not necessary for blind holes to be hard internally, these difficulties can be avoided by packing the holes prior to the quench, using clay, asbestos rope, steel wool, or a steel plug.

Blind holes are particularly objectionable if they must be uniformly hard on the inside surface. The only way to meet this requirement consistently is to select a grade of air-hardening tool steel.

Be Sure to Try Red Sabre Tool Bits

You're sure of economical cutting when you use Bethlehem Red Sabre Tool Bits, regardless of the type of application. Red Sabre is a super high-speed steel, with about 1.50 carbon, 12.00 tungsten, 5.00 vanadium, and 5.00 cobalt. The bits have high red-hardness and uniform hardness all the way through, for peak resistance to wear and maximum cutting ability. They come hardened to Rockwell C65.

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The IRON AGE

October 13, 1960—Vol. 186, No. 15

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News of the Industry

GERMAN TOOL SHOW

Boom Is Real—Exhibitors at the Hannover Fair displayed the latest in German machine tools. The show gave ample evidence that the country's industrial boom is real—and with reason. P. 48

GLOBAL AIR FREIGHT

Pays its Way — Metalworking industries are using air freight for more than emergency shipments to foreign markets. It is frequently less expensive than water transportation. P. 49

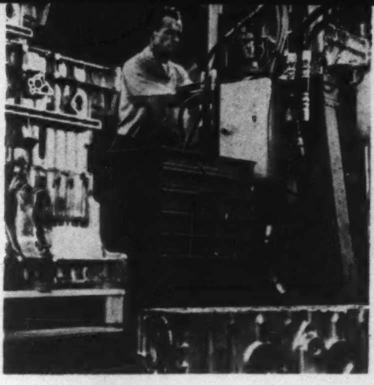
STANDBY STEEL CAPACITY

How Much Is Obsolete?—High-cost, marginal mills are included in the steel industry's rated capacity. Operating these mills doesn't appear practical, even in peak demand periods. P. 50

AUTOMOTIVE

More Aluminum?—The use of

Metalworking



Cover Feature

New Trends—Aluminum engine blocks for Ramblers are cleaned at Doehler-Jarvis plant after diecasting. This week's Special Report analyzes this and other materials trends in 1961 cars. Changes in materials are the most significant in years. P. 45

aluminum in 1961 cars will be higher than in 1959, although some cars will drop aluminum percentage. P. 59

MACHINE TOOLS

Unified Research—Advances in machining technology may depend on research using all of the physical sciences and engineering. P. 65

Engineering-Production Developments

RAPID HEAT TREATING

From a Fluid-Bed Furnace — A recent advance in heat treating gives the user faster production and improved product quality. The new unit also lets the heat treater perform a number of precise heating and quenching cycles. When a run is over, no post-style cleaning treatment is needed. P. 81

PLATING THICKNESS

Checked by X-Ray—There are two reasons why accuracy must be maintained in measuring thicknesses of precious metal coatings. One is cost. The other is the solution's effect on the material itself. A variety of procedures, based on the X-ray emission method, handles a wide range of parts. P. 84

CUTTING GRINDING COSTS

With a Planned Program — A dual-phase program can reduce your grinding expenses — without any capital outlay. The secret hinges on manually-programmed power and the proper choice of lubricants. It results in extending life of coated-abrasive belts. P. 88

SHIELDING METALS

For Nuclear Use — No single material has all the properties of an ideal chemical and nuclear shield. But a new line of metallurgically bonded, lead-clad metals promises to fill the void. New methods now insure sound bonds between the metals. P. 90

STAINLESS FASTENERS

Cold Working Them—By using Type 304 stainless, a fastener manufacturer is getting excellent corrosion-resistance properties into the product, while eliminating any need for heat treatment. It results in simplified production. P. 92

Market and Price Trends

SPACE AGE

Profitable Contracts?—Are space age contracts really profitable? Experts in the field warn industry leaders that companies can lose money unless they proceed with caution. P. 52

WEST COAST

A Dark Picture?—A recent survey of Farwest businessmen notes that business there has a dark side too. However, the fourth quarter is expected to bring continued expansion. P. 63

STEEL SUMMARY

Better Tone—If inventory cutbacks have ended, as many believe is the case, orders will have to pick up. Some improvement in new business is noted and the market appears to have a somewhat better tone this week. P. 133

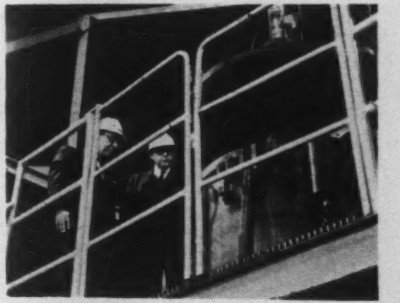
PURCHASING

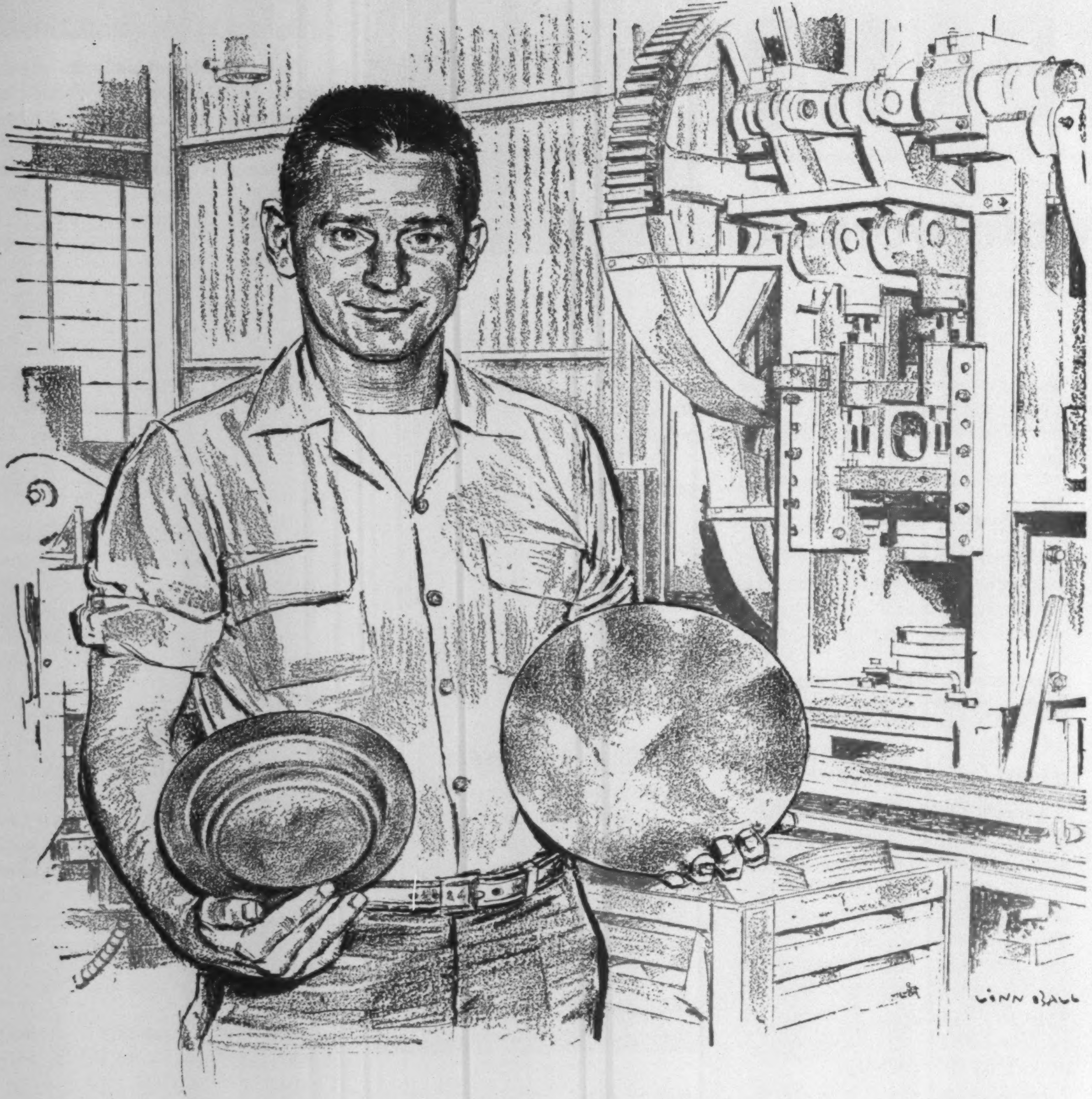
Important Commodity — Buying transportation is an important purchasing job, says J. A. Schilpp, director, traffic and purchasing, H. K. Porter Co., Inc. Sound traffic planning can save a company a great deal of money. P. 134

NEXT WEEK

VACUUM MELTING

Progress Report—Crucible Steel Co.'s president Joel Hunter, right, and M. J. Day, vice president, commercial, are in the thick of the development of vacuum melting. Next week's Special Report rounds up developments in the U. S.





"We have learned to rely on Sharon for top quality Stainless Steels"— JOHN SHRAGG, Foreman of the Press Dept., Ekco Products Company

"Modern utensil design calls for real workable stainless steels," says John Shragg, press room foreman at Ekco Products Company's Massillon, Ohio, plant. "For consistently fine quality," he continues, "we have found we can always rely on the *Sharon Steel Corporation, Sharon, Pa.*"

SHARONSTEEL **SHARON** *Quality* **STEEL** Steel

Unions and Management: Is There a Common Ground?

Last year's steel strike and this year's Pennsylvania Railroad strike almost brought compulsory arbitration by government fiat. This danger to free bargaining remains in the background. It will be out front again when we have a strike which the government, either in the Administration or Congress, believes hurts the nation.

Management concedes a union's right to strike. Unions insist that is the only basic right they have. Both sides issue statements and propaganda while negotiations and strikes are under way. That is normal procedure.

Over the years it has been normal union practice to involve the national government in its embroilments with management. This has paid off. If government had not been brought in, one way or the other, unions would have gained far less than they have. It may be that mediators at times were more interested in ending strikes than they were in recognizing the probable long-term effects of their settlements.

The public relations era has not helped unions and management to settle their feuds. Each side attempts to capture the "public mind." Negotiations often are by radio, TV, and the nation's press. Whether or not the people are even interested has never been proved conclusively. It is probable that they are not—unless they are immediately affected.

Management faces world competition, higher and higher labor costs, pressure for lower prices, threats of government control, and, at times, irresponsible union stewardship. That is a big job. It calls for the highest type and the most intelligent and practical leaders.

Unions have become big business. The old philosophy of helping the poor, raising wages from sweat-shop level, releasing men from "industrial bondage" and policing management is outmoded. Yet it is still mixed in with today's union "executive suite" posture. It is time for union management to catch up with industrial management in goals, methods, and cooperation.

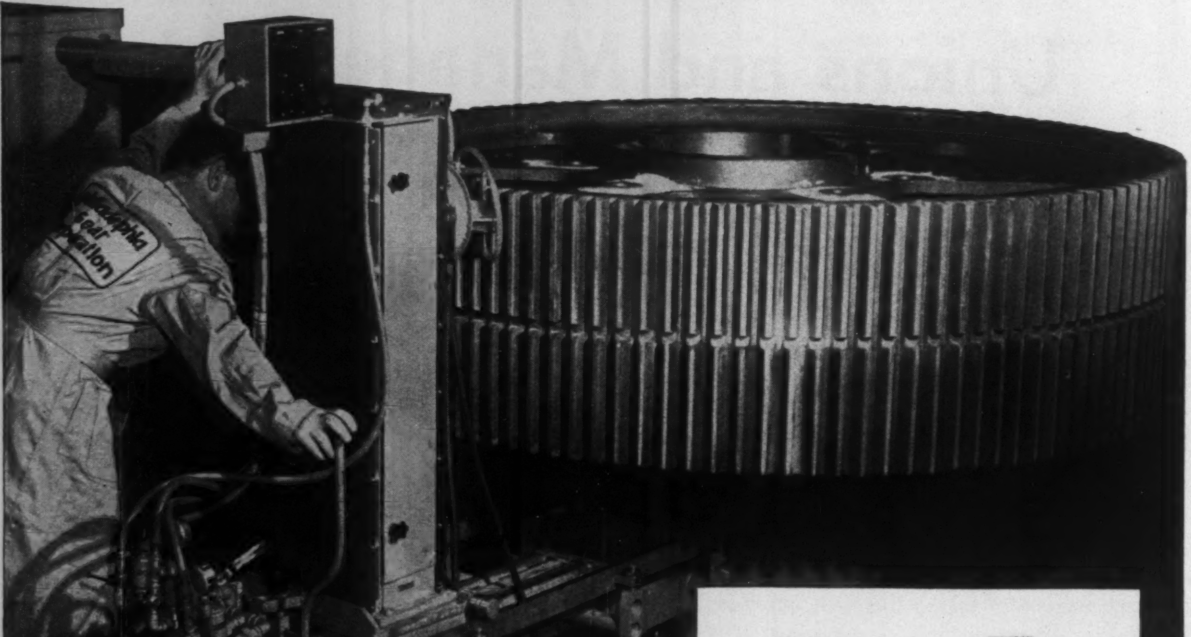
There must be greater attempts by both sides to meet and compromise issues. Unions must recognize management's problems in this uprooted world. Both must heed our national interest—on a non-partisan basis.

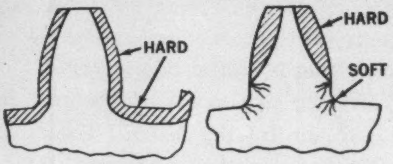
Failure to do these things means compulsory arbitration as sure as death and taxes!

Tom Campbell

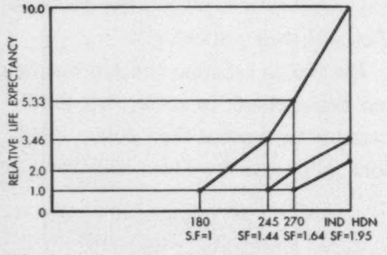
Editor-in-Chief

New Philadelphia induction hardening increases life of large gear drives . . .





New Philadelphia full contour induction hardening (left) provides a continuous hardened area from one tooth flank around the root and up the other flank without interruption. There are no points of stress. Typical heat treated gear (right) shows inadequate hardening of root of tooth, a point of major stress.



This chart shows the relationship between load and gear life. Note that the improved service factor of a gear set may be used to substantially increase gear life, rather than to increase the load.

HERE'S WHY: Full tooth contour induction hardening of large gears provides a uniformly hardened surface from one tooth flank around the root and up the other flank without interruption. Eliminates points of thermal stress concentration. And there is no distortion, a problem of heat treated gearing that requires subsequent grinding.

This new, advanced Philadelphia method permits radical reduction in sizing and/or increased load carrying capacities. And it can easily harden even the largest spur, helical and herringbone gearing up to 180 inches in diameter, 20 inches in face, and 3/4DP.

Learn more about this new method for increasing the service life of your gear drives. Write for your copy of Bulletin 100.

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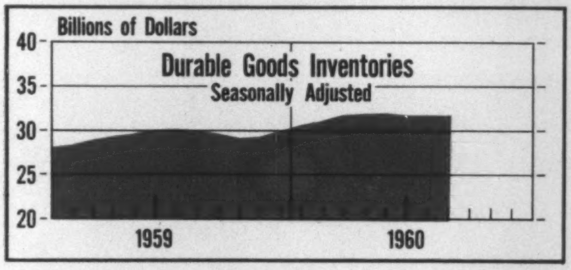
Inventories Static in Durable Goods

Durable goods inventories continued to hold at $32 billion through August while total inventories dropped some $200 million during the month. Principal interest in inventories, however, is not so much the total, but in the stage of manufacturing. In durable goods industries, the gain from last November has been mostly in finished goods, some $1.5 billion, while purchased materials and goods in process have increased to a lesser extent.



Another factor: Current inventories in durable goods industries, at $32 billion, probably represent a much longer time measurement (days of inventory) than the $29.7 billion a year ago when the steel strike was on. Most of the decline in total inventories, from $93.3 billion to $93.1 billion, was in reduction of retail stocks of new cars.

What's the Business Trend Now?

Government economists are about the last to concede the economy is in a period of recession (correction, if you prefer). Most of the professional consultants have been bearish for some time. Eliot Janeway, most bearish of them all, forecast a recession as long ago as last January. L. H. Lempert, director of Statistical Indicator Associates, also warned of the change. Important factors to consider are an apparent drop in capital spending and hard going for consumer durables.

But the worst is already over for some industries, steel, for example, before many are recognizing the correction period. Estimates vary, but you can expect a major upturn in 1961, around mid year.

Machine Tools Get New Orders

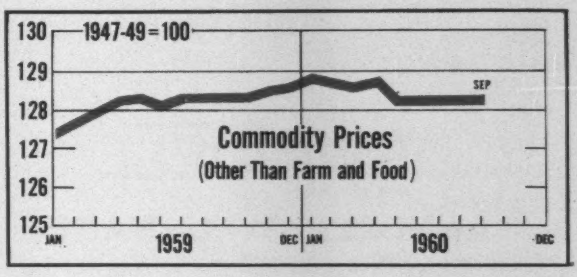
The aftermath of the Machine Tool Exposition in September is now reflected in new orders, machine tool builders say. Warner and Swasey Co., Cleveland, received more orders from machine tools in September than in the previous 4½ months. Walter K. Bailey, company president, attributes the surge of new business to the Exposition. The company's backlog tripled in a two weeks period.

New Cars: How Will They Sell?

With the new 1961 cars now on the market, attention now turns to how well they will sell. In spite of some of the most significant developments in years (see p. 45), a lot of pessimism shows through. For one thing, 1960 has been a good automotive year and good years seldom occur back to back. One economic consultant, Lionel D. Edie & Co., gloomily predicts the 1961 calander year will hit only 5 million cars. Most of the decline, if not all, is expected to occur in the regular-size group, with compacts holding their own.

Prices Reflect Rough Competition

Like most indicators, commodity prices show a sideways trend and reflect little more than a competitive price situation. The index of all commodities (other than farm products and food) continues at 128.2 (based on the 1947-49 = 100.) A number of nonmetallic products climbed during September, but declines in scrap, principally, kept the index level. A year ago, the index was 128.4. At that time, prices of many materials, including scrap, were higher. Scrap, of course, is depressed. And competition for business is keeping many commodity prices from climbing.



New Markets for Vacuum Melting

Submarine hull plates could prove a big new market for vacuum melt steels. The Navy is reportedly interested in vacuum melting as a means of meeting demands for improved quality of hull steels. The program has been moving slowly, according to sources in this specialized field, because tonnages needed might strain vacuum melting capacity and cut into other defense programs.

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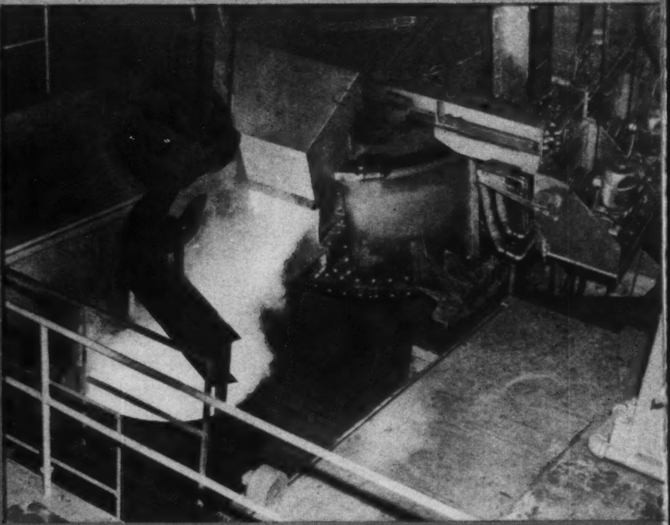

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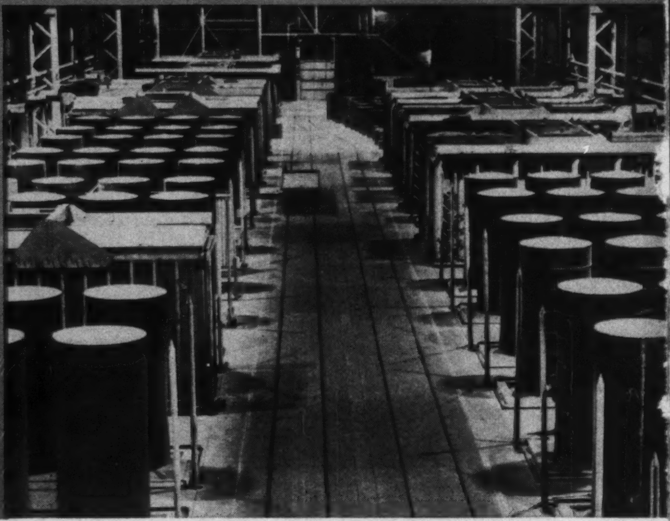
Designed and built with the greatest continuity of steel-melting experience in the industry, SWINDELL Electric Arc Melting Furnaces offer the most advanced construction features for increased production rates, lower production costs, and a higher quality product. Let us match your melting requirements with the details of SWINDELL furnace performance, at your convenience.



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IUE-GE: Violence Stalls Negotiations

The violence-punctuated strike of the International Union of Electrical Workers against General Electric doesn't seem headed for an early settlement. IUE represents 70,000 of GE's 240,000 workers at 55 of the company's 166 plants.

VIOLENCE: Cooling off.

Union-management negotiating sessions have brought no change in the stand taken by either side. Both sides are following the pattern of steel and auto negotiations of the past few years. Public relations departments are waging the early battles. Full-page newspaper ads are being used to justify positions, gain public support.

Picket-line violence has lead to a number of arrests in Syracuse, Schenectady, and Pittsfield, Mass. Incidents have occurred in other cities as well.

Union and company have almost routinely filed unfair labor practices complaints with the National Labor Relations Board. And GE is seeking court injunctions to ban mass picketing. Little serious negotiating can be expected until things calm down.

Other developments include the not-unexpected announcement by the AFL-CIO that it supports the IUE stand. However, the Teamsters Union has said its members will cross picket lines to avoid violation of the new Landrum-Griffith labor law.

Decade Ahead Calls For Readjustments

Management and workers are in for an enormous readjustment in the present decade. New entrants into the labor force will be about double those in the past 10 years, a top labor authority said in Cleveland last week.

The 13th annual fall meeting of Associated Industries heard a number of other speakers agree that:

Work rules are not established overnight, and not changed that fast either.

A strike isn't the worst thing a company can take, and many have long-term benefits.

The greatest failing of companies is in not taking a firm stand, even on small points, so that labor will know how far it can go.

Communications with employees must be kept up steadily, not just during crises. And a little admission of losses and past mistakes is justifiable.

Labor's challenge in the 1960's will be to absorb double the new labor force entrants of the last decade, E. R. Livernash, Harvard Professor of Business Adiminstration told the group. This surge will come from abandonment of jobs now being done, transfer of released workers into other jobs, and a host of new jobs developed by technology.

ILO: Plans Program Expansion

David A. Morse, director general of the International Labor Organization, predicts that the technical and social assistance program of ILO would total about $50 million for about 50 projects in the foreseeable future.

Currently ILO figures to spend about $13 million on 13 projects.

Mr. Morse asked a gathering at the World Affairs Center in New York last week to have faith and to support ILO no matter what its current faults appear to be.

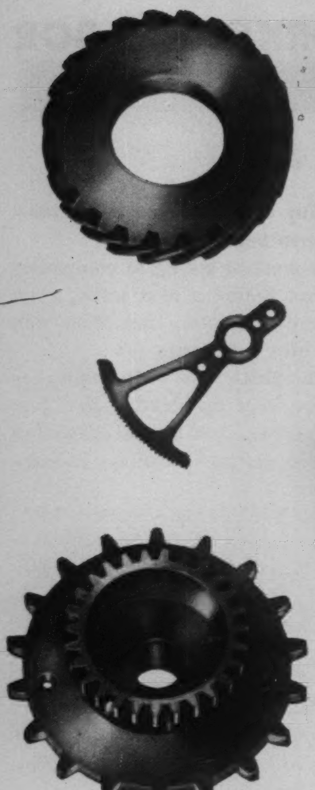
Charles H. Smith, Jr., president of Steel Improvement Forge Co., Cleveland, and a representative of U. S. employers to the last ILO sessions, warns that communists are definitely gaining in power within ILO.

The basic organization of ILO is tripartite, with spokesmen for workers, employers, and governments of all member nations.

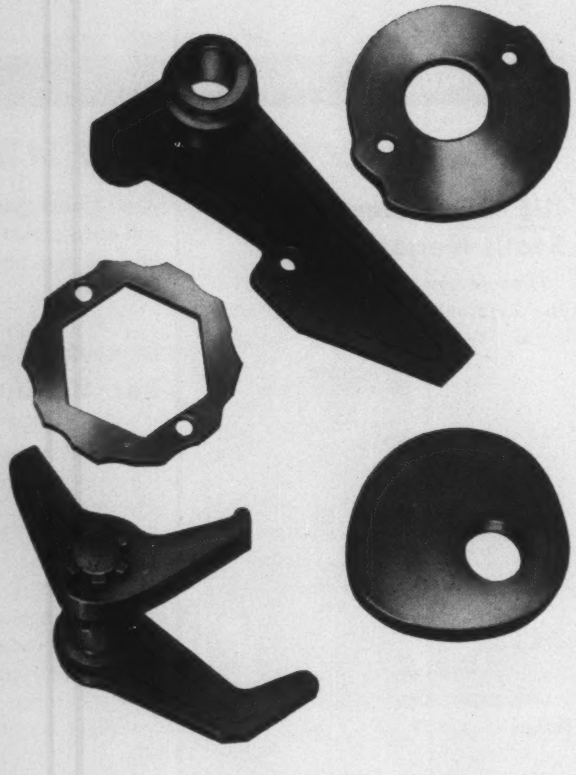
Mr. Smith contends that Russian employers are actually part of the government and should not be accepted in any other category.

Rebuttal came from George C. Lodge, son of the Republican vice presidential candidate. He is Asst. Secretary of Labor for International Affairs, and a government delegate to ILO.

He suggests that the communist menage is not really a menace as it has only two delegates out of 80. In fact, he contends, communist influence in ILO is steadily declining. Further, he lashed out at the employer group for having voted against every ILO budget presented to them.



INVOLUTE GEARS



NON-INVOLUTE PARTS

FELLOWS GEAR SHAPERS DO DOUBLE DUTY

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Gear Shaper

Fellows Gear Shapers are not limited to the production of gears alone. They are valuable production machines ideal for the manufacture of many types of parts, of both involute and non-involute form.

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THE PRECISION LINE Fellows *Gear Production Equipment*

WASHINGTON

Metalworking Newsfront 3

By R. W. Crosby

★ Defense Timetable Shortened

Defense industries should prepare themselves for quicker changes of pace in defense spending. A timetable set up on present "lead times" will no longer fit Defense Dept. plans.

The Pentagon is cutting down the time span between order and delivery of defense items wherever possible. The year-to-year budget cycle has been discarded. Now, the military is working on a month-to-month basis in revising its buying in accord with changing technical and international conditions. This means more spending for advanced defense projects.

Defense sources say the revisions will have "an important impact on industry."

Over and above the defense money voted by the Congress this year, the Defense Dept. carried over an unobligated $8 billion. Though this money has been committed for certain projects by the Department, no contracts for it have yet been given to private industry. Pentagon budget men say at least two to three billion of it will be doled out this year.

The unspent military funds will be used as needed. The important thing to industry is that the needs will be checked monthly. The money could be spent at any given moment.

Defense Secretary Thomas S. Gates, Jr., says the month-to-month approach to spending is the reason behind recent piecemeal announcements of defense spending.

This month increased missile spending was announced. Next month it could be anything from airplanes to Army modernization.

Latest new spending is $306 million to strengthen the Army and Navy missile arsenal. The Navy has more than $106 million more for submarine-launched Polaris missiles. The Army has an extra $200 million for development of the Nike-Zeus interceptor missile.

The next decision on spending is expected to be for the B-70 bomber. Mr. Gates says a decision on the B-70 will be reached soon.

■ Balanced Budget? Not This Year

The Administration is counting on a business upturn in the closing months of 1960 to save what is left of the 1961 budget surplus.

But economists in and out of government doubt there would be as big a business spurt as was anticipated by a new budget report.

With revenues down and spending up, the $4.2 billion surplus proposed last January by President Eisenhower has melted to $1.1 billion. Far from being in an upturn, business is scarcely holding its own. It's unlikely that the trend will be reversed in time.

■ Important Cases Before Court

The U. S. Supreme Court began making its first decisions of 1960 this week. Rulings to come in this high court session—on union rules, antitrust laws and trade restrictions—will have an important affect on industry.

The nine justices will try to answer such questions of importance to the business world as:

Have government trustbusters gone beyond the bounds of the anti-merger laws in prosecuting antitrust cases?

Can a worker be forced to join a union when a portion of his dues is used to support political purposes he opposes?

Can the President modify U. S. Tariff Commission recommendations on trade restrictions?

Does a company have to dispose of its stock-holdings in another company when the court rules this interest violates the antitrust laws, or can it escape the monopoly ruling by not voting its stock?

Can a company or an industry conduct a public relations campaign with the intended purpose of influencing legislative acts against its opposition?

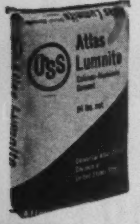
■ Who Said Recession?

The "recession" controversy still swirls in Washington. Some Democratic senators still are not convinced that the Commerce Dept. didn't secretly report a recession to President Eisenhower.

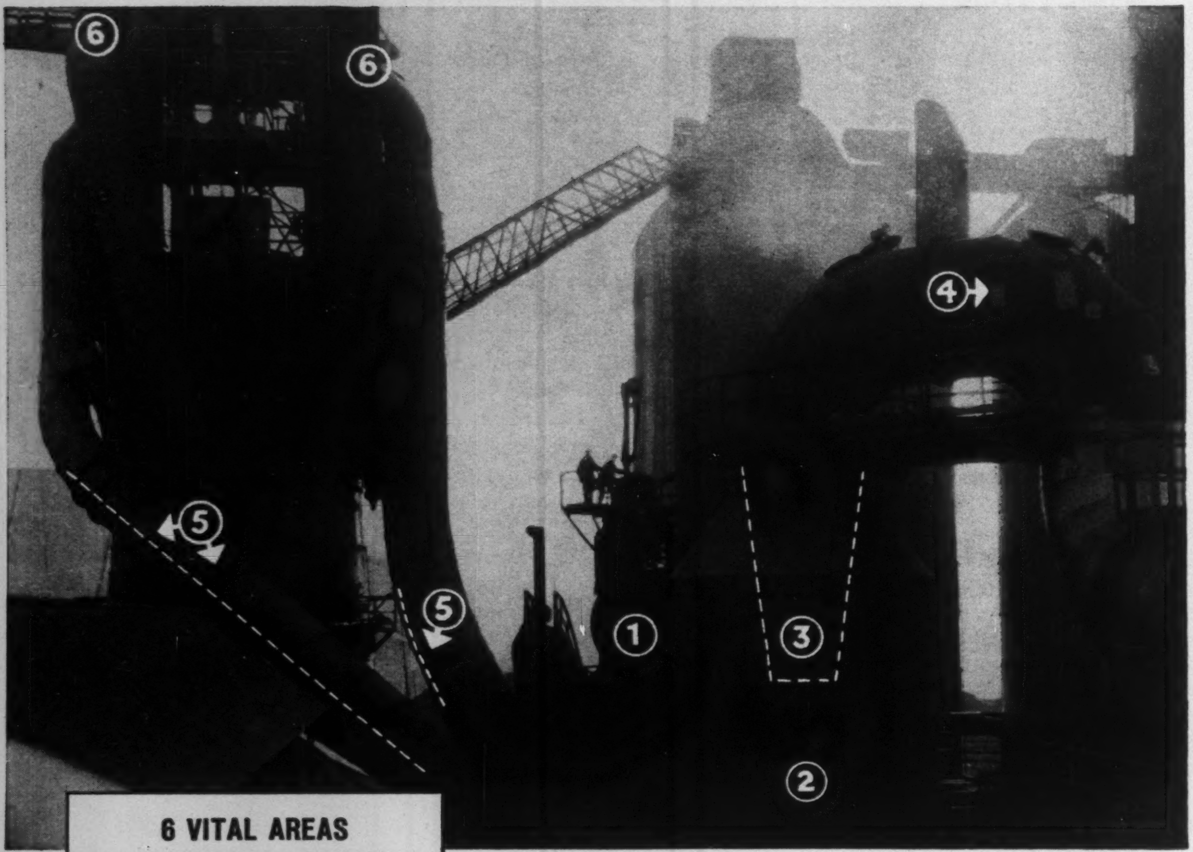
MUELLER: Secret Study?

Thirteen Democratic senators asked Commerce Secretary Frederick H. Mueller if there was any truth to reports that his department has prepared such a "secret study."

Mueller emphatically denied the report twice, once to the senators and then publicly. He went on to chasten the senators for "undermining the confidence" of the public by making the "secret study" allegations.



Industrial concretes protect blast furnace "hot spots"



6 VITAL AREAS REPAIRED WITH LUMNITE

gun-applied industrial concretes in blast furnace downcomers and dust separator, National Tube Div., U. S. Steel, McKeesport, Pa.

1. **Dust catcher,** spot repairs to brick lining.
2. **Dust separator** shell, complete lining.
3. **Inner cone,** complete lining.
4. **Elbows and piping,** lined for 65 lineal feet.
5. **Downcomers,** gunited for 120° arc in pipe bottom.
6. **Connections between uptakes and downcomers,** spot-repaired (two other connections gunited not shown).

For repairs or new installation, industrial concrete linings in blast furnace equipment solve many abrasion, erosion and heat problems. In addition, these monolithic concrete linings provide insulation. Made with LUMNITE calcium-aluminate cement and suitable aggregates, concrete linings are easy and economical to place — by guniting, casting or troweling. Unit downtime is reduced because concrete reaches service strength in 24 hours. For greater convenience, castables containing LUMNITE cement are available from leading manufacturers of refractories. These are packaged mixtures, ready to use by adding only water. For more information, write Universal Atlas Cement, 100 Park Avenue, New York 17, New York.

L-199

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USS

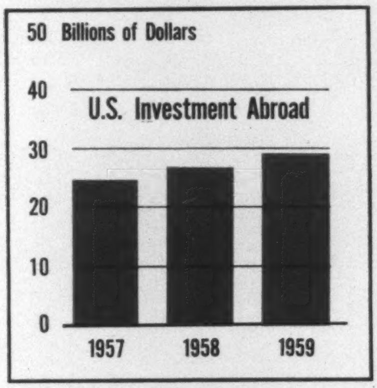
**Universal Atlas Cement
Division of
United States Steel**

OFFICES: Albany · Birmingham · Boston · Chicago · Dayton · Kansas City · Milwaukee · Minneapolis · New York · Philadelphia · Pittsburgh · St. Louis · Waco

U. S. Foreign Investing Drops Slightly

U. S. companies are spending slightly less dollar volumes in direct overseas investments this year than they did in 1959.

Reports for the first half of the year indicate that direct-investment outflows are at a rate of about $1 billion, and a similar amount is being invested abroad annually out of undistributed profits of foreign subsidiaries. The 1959 figures for both categories totaled $2.5 billion.



During 1959, U. S. companies continued their buildup of European production facilities by adding nearly three-quarters of a billion dollars in direct outflow and retained earnings.

The United Kingdom leads as the most attractive investment area for U. S. companies. But also getting a big share of the dollar outflow are Germany, France, Italy, and the Netherlands.

During 1959, capital flow and undistributed profits added $800 million to U. S. investments in Canada, and $615 million in Latin America. The Cuban situation has cut off investment dollars headed for that country and some of these will likely be used in Argentina for oil development and manufacturing.

On the other hand, U. S. investments in Africa are still proceeding at a relatively slow rate.

In 1959, the growth in manufacturing investments abroad exceeded $1 billion for the first time. They accounted for 40 pct of the overall increase in direct investments.

European Nations Eye Africa's Potential

The potential of new African nations is being carefully scrutinized by both inner and outer European groups. One of the big questions is how soon a steel industry can be set up, and how much fabrication, stamping and forging will take place over the next several years.

Also on the question list is the outlook for manganese, copper, iron ore and other materials now that Africa is a hot nationalistic area. Some interest has been shown in the possibility of establishing textile plants, probably on the assumption they would compete well with Hong Kong and Japan.

It's no secret that European industrialists are already in Africa looking over what might develop into a highly industrialized area.

Chrysler Car Exports Climb in 1960

Sales of Chrysler Corp. passenger cars in overseas markets in the first half of 1960 accounted for more than 21 pct of all U. S. and Canadian auto industry export passenger car sales.

At the same time, the company's sales of trucks accounted for almost 18 pct of all U. S. and Canadian export truck sales.

The passenger car sales are up 6 pct over the same period in 1959, and truck exports are up 3 pct.

Chrysler's imported car, the Simca, has increased sales by 77 pct in countries where Chrysler International handles Simca sales.

Chain Belt Enters S. American Deal

Chain Belt Co. has again expanded its foreign interests with the acquisition of an interest in an Argentine chain manufacturing company.

Co-owner of the firm, Polimencanice, S. A., Buenos Aires, is the Italian Ancarani-Torri interests. It is the fifth foreign venture Chain Belt has made since June 1959.

The announcement comes at the same time when Argentina is pointing with pride to its dramatic economic recovery under the free enterprise system of the current government.

Trade Margin Drops During August

The U. S. export-import margin rise over the past four months suffered a setback in August when the gap between the two was the narrowest since last March.

Imports during August rose to $1.2 billion, up 6 pct over July and 3 pct over August, 1959. During the month, exports of military and civilian goods dropped to just over $1.6 billion, down 5 pct from July.

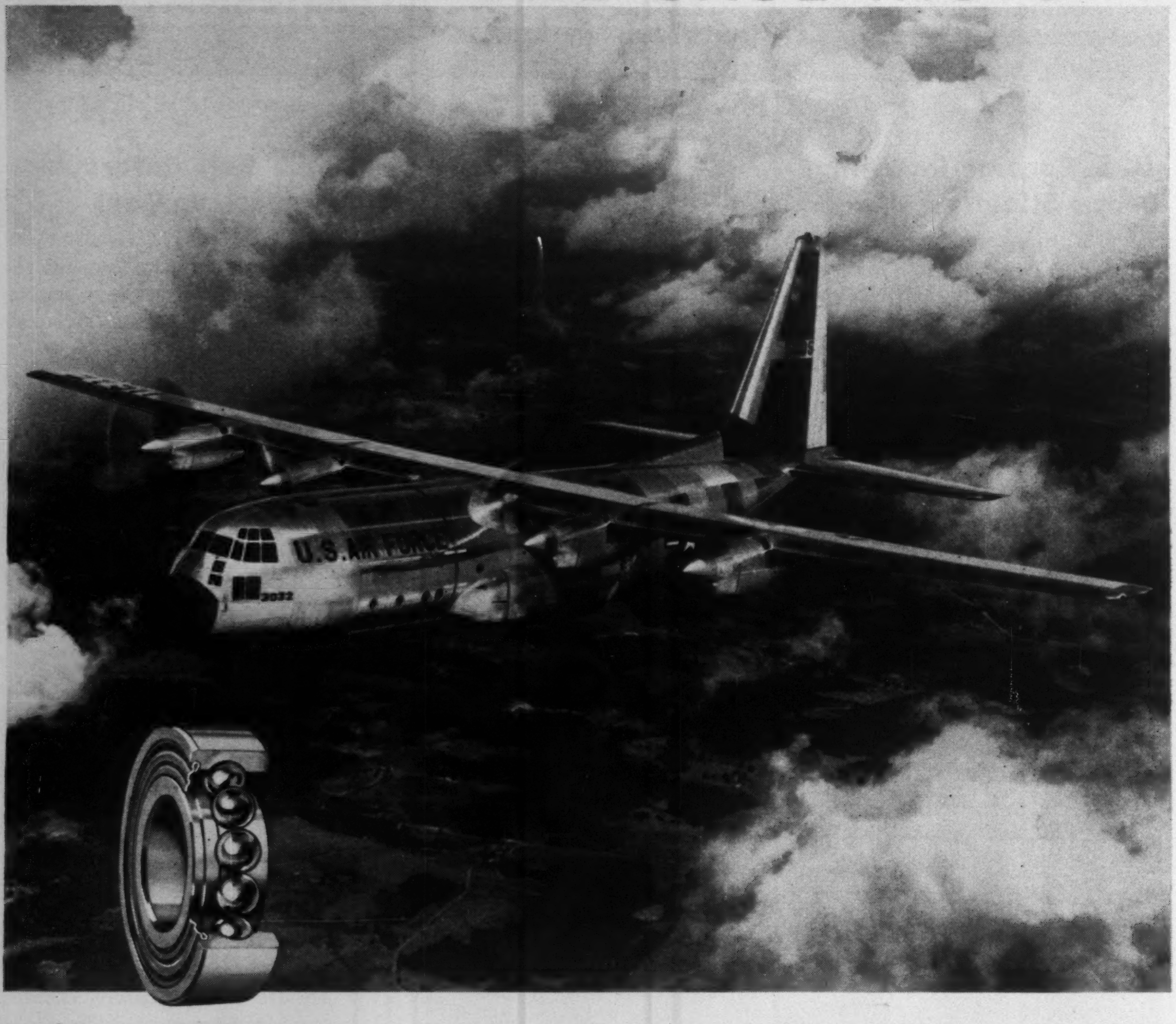
The excess in exports over imports dropped to only $382.4 million, the smallest margin since the $375.9 million gap last March.

Volkswagen Buying U. S. Tools, Steel

The Volkswagen may hurt domestic car sales, but at the same time it helped ease the slowdown in the steel industry and means sales for machine tool builders.

During the first half of 1960, Volkswagenwerk bought $2.5 million worth of U. S. sheet steel and is presently buying about 3300 tons monthly.

NEW DEPARTURE CASE HISTORY



N/D SPECIAL ALLOY BALL BEARINGS KEEP BUTTERFLY VALVE MODULATING AT 900°F.!

PROBLEM: Require highly heat-resistant ball bearings for butterfly valve which modulates 900° F. hot air blast in turbine air bleed. Despite radial loads up to 300 lbs., shaft must turn effortlessly through 65°.

SOLUTION: New Departure Sales Engineers, cooperating with Stratos, manufacturer of the constant speed auxiliary power turbine, recommended N/D's special aircraft ball bearing of cast cobalt base alloy for this critical application. These bearings were selected for their ability to withstand extremely high temperatures without deterioration.

Extensive testing proved that the bearings in this N/D equipped modulating system, currently used on the Lockheed Hercules C-130A military transport, operate at required standards of performance and reliability . . . and without lubrication! What's more, maximum turbine speed variation, produced by full throttle, is completely corrected in 1.5 frictionless seconds.

If your aircraft accessory designs require bearings that operate efficiently at unusually high temperatures and speeds, invite a N/D Sales Engineer to participate in your early design discussions. For additional information call or write New Departure Division, General Motors Corporation, Bristol, Conn.

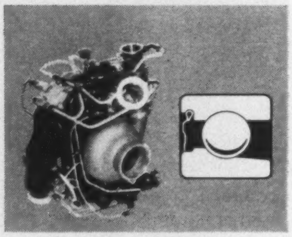


Photo: Courtesy Stratos Division, Fairchild Engine and Airplane Corp.

Auxiliary power turbine equipped with cobalt base alloy N/D ball bearings which operate successfully at high temperature without lubricant protection!

NEW DEPARTURE

BALL BEARINGS · PROVED RELIABILITY YOU CAN BUILD AROUND

Reduce Mill Slowdown Time

Today, the trend is to operate temper mills at speeds up to 7000-8000 fpm. This has led to the design of a digital slow down system. Automatic computers in the new system monitor the diameter of a coil in the pay-off reel. They signal the proper time when slowdown should start. This reduces the overall coil-processing time by eliminating the guesswork in visual slowdown analysis.

Coating Withstands 1000°C

Nickel-aluminum alloys have good corrosion resistance, but they're also very brittle. The NBS has found a way to use this optimum corrosion resistance—while reducing overall forming problems. The secret hinges on a dual-stage process for making high-strength, nickel-aluminum coatings. These coatings protect base metals from salt spray and oxidation at heats up to 1000°C.

Inspects Used Bearings

An electronic detector inspects used bearings and points out flaws no deeper than 0.00001 in. —without any need for disassembly. Defects on races or rolling elements produce vibration peaks. These peaks are superimposed on random vibrations that are generated by undamaged rolling surfaces. Inspection takes place as the detector distinguishes between peaks. One bearing is checked every 60 seconds.

Quality and Quantity

Disposal of spent uranium presents costly and dangerous headaches. To work around the problem, the government will construct the world's largest power plant—using waste uranium as fuel. This plant requires more than 1,000,000 ft of prime stainless steel tubing. X-rays check every inch of each welded tube. A single flaw in any 58 ft length fails the entire tube.

Improves Mill Efficiency

The first known attempt at adequately lighting and heating a steel mill has been made in a new cold-strip mill of Inland Steel Co. near Chicago. A heating and ventilating system gives thermostatically-controlled heat in winter. It circulates air in the summer and gives a complete air change every hour. Inland hopes this system will improve morale and efficiency. Total coverage is 850,000 sq ft or 20 acres.

Oil Serves Blast Furnace

Simulating a blast furnace, a pilot plant uses heavy oil as part of the furnace fuel. This promises to reduce iron-making costs and to boost furnace capacities. Heavy oil, which contains hydrogen, yields heat-producing reducing gases that speed the reduction of ore into iron.

Grind Welds at 2000°F

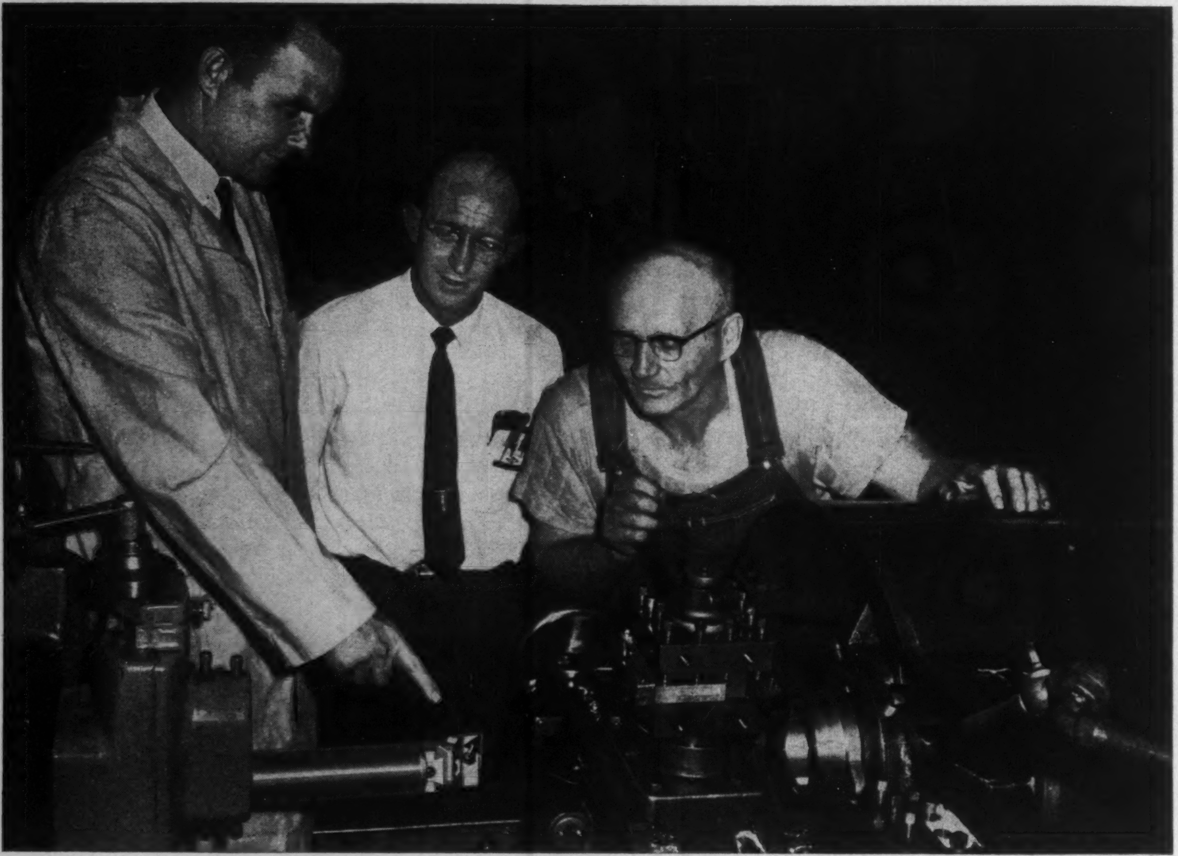
Six grinding heads use coated-abrasive belts, with hard-plastic bonds, to remove excess "weld" metal from steel rails—right after fusion. This operation centers on ribbon-formed railroad tracks. After track ends are butted together at a pressure of 3000 psi, the belt grinders remove the hot, soft metal from the fused joints. Up to ¼ in. of metal is ground from each surface, with no time lag in the high-speed, rail-forming process.

Grease on Tap

Centralized lubrication systems can really pay off. With the accent on economy, the Cities Service Co. recently announced a new method for the bulk delivery of grease to industrial plants. Key to this radical delivery method is a fleet of tractor-trailer units with special containers. Each tractor handles two round, vertical containers. The duel containers hold 24,000 lb of grease. This grease is pumped directly into a plant's central storage tanks in about one hour.

Lead-Clad Metal Shields

Shielding in the chemical and nuclear fields offers great challenges, problems and opportunities. No single material has all the properties of an ideal shield. Among the prime needs are gamma and neutron shielding, structural strength and stability, corrosion resistance and heat-transfer ability. A new line of metallurgically-bonded, lead-clad metals promises to fill all these needs.



Kennametal Carbide Engineer, Tool Engineer and Machine Operator

3-man team solves operating problem
... replaced 5 "special" bars with 1 K-Bar —increased machine speeds—improved product

PROBLEM: Three bores on this 8620 steel casting chuck end required five special boring bars. Constant problem was chatter and inability to hold size.

SOLUTION: Kennametal carbide engineer, working in cooperation with the tool engineer and the machine operator, recommended that one Kennametal* K-Bar be tried for all three bores.

RESULT: One K-Bar outperformed the five bars—increased machining speeds, reduced operating time, reduced tool maintenance, eliminated weaving and chatter, provided better finish.

That's the kind of product plus service that you can get through your Kennametal carbide engineer. Thoroughly trained in carbide products and applications, over 100 Kennametal field engineers and service men provide on-the-spot analysis and recommendations. If your job requires unusual and special design, engineering and application service, your Kennametal man will make our headquarters research, engineering and manufacturing facilities available.

Depth of on-the-job experience—plus the continuing development of a variety of tungsten, titanium, and tantalum carbide grades—has lead to the use of Kennametal compositions in practically every industry. And our product development group, by working in close cooperation with design engineers, sales engineers and customers, keeps coming up with new products and new applications—engineered and developed to meet both general and specific customer requirements.

Whether it be in metalworking, mining, or general industry, there is a quick and proven way to find what Kennametal products and services can do for you. Just form your own 3-man team—two selected from your organization plus your nearest Kennametal Carbide Engineer. You can phone him or write direct to KENNAMETAL INC., Dept. IA, Latrobe, Pennsylvania.

*Trademark

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KENNAMETAL
...Partners in Progress

LETTERS FROM READERS

A Great Help

Sir—This is to express our appreciation for the very fine article which appeared in a recent issue of The IRON AGE covering operations of one of our machines at Convair's Astronautics plant near San Diego.

As a matter of fact, radial draw forming, while it employs stretching, produces entirely different results and the demonstration at Atlas has resulted in requisitions for a number of Bath Radial Draw Formers for plant modernization programs.

Interestingly enough, too, the application of a similar principle to draw press work in the automotive field is demonstrating some quite substantial savings in die and press operations. I'm quite confident that once this process is understood as an entirely new development in the machine tool field, which is what it is, that this will result in a very material increase in our orders.

Such recognition as your article accords us, is a great help in the right direction, and much more importantly in national defense rather than the narrow interest of our own affairs.—Cyril Bath, Cyril Bath Co., Solon, O.

Informative

Sir—We have just finished the last article by Dr. F. J. Gaudet entitled, "If You Want to Advance You'll Need a Plan." We found it to be very interesting and informative. May we please have 12 copies of this article for distribution to our sales force.—J. J. Jensen, Dominion Foundries and Steel Ltd., Hamilton, Ontario.

- **The copies will soon be enroute. —Ed.**

Noting

Sir—We have noted with interest the article of your September 15 issue entitled, "Modern Steelmaking Processes Boost Quality and Output." Of particular interest to us, of course, was the recognition given to our Strategic-Udy processes with regard to Venezuela, Texas, and Universal-Cyclops Steel Corp. It would be appreciated, therefore, if you would forward us ten copies of this article.—C. M. Moga, Strategic Materials Corp., New York, N. Y.

- **Copies are enroute.—Ed.**

Doctor's Aid

Sir—I am presently attending the Univ. of Houston where I am working toward a Ph. D. degree majoring in economics. This semester I am studying "Business Cycles" and "Public Finance." As an aid in my studies to meet the degree requirement, I would appreciate receiving a reprint of the article, "Are We Heading into a Prosperous Recession?" which appeared in The IRON AGE of January 2, 1958. I have already found your magazine to be one of the best in the industrial field.—Iris F. Harmon, Houston, Tex.

- **A reprint of this article has been mailed.—Ed.**

Most Helpful

Sir — We have been following your series on the 1960 Metalworking Dollar with great interest. The final article in the series, which appeared in a recent issue of the magazine, is especially enlightening to us and would be most helpful if we had it for circulation to all of our sales representatives.—J. R. Kruizenga, Great Lakes Screw Corp., Chicago, Ill.

- **Reprints have been sent to you. —Ed.**

Industrial Value

Sir—Would you kindly forward one copy of the recent article on "Special Fasteners." We feel that this article is of particular interest and should be of value to all industry in general.—Harry S. Brenner, Almay Research & Testing Corp., Los Angeles, Calif.

- **The requested copy has been mailed.—Ed.**

FOR VARIETY

STANDARDIZE 100% ON SOUTHERN FASTENERS

A stock of 1,500,000,000 USA-made fasteners means that Southern's variety of items, sizes, materials, head styles and finishes can be your source of constant supply. Standardize 100% on Southern fasteners, and forget about carrying a large, costly, space-consuming inventory. Let Southern's variety and famous service help solve your fastener problems.

It will pay you to try Southern on your next order. Write today, using your letterhead, for our Stock List showing current variety of fasteners ready for delivery in large or small quantities. Address Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

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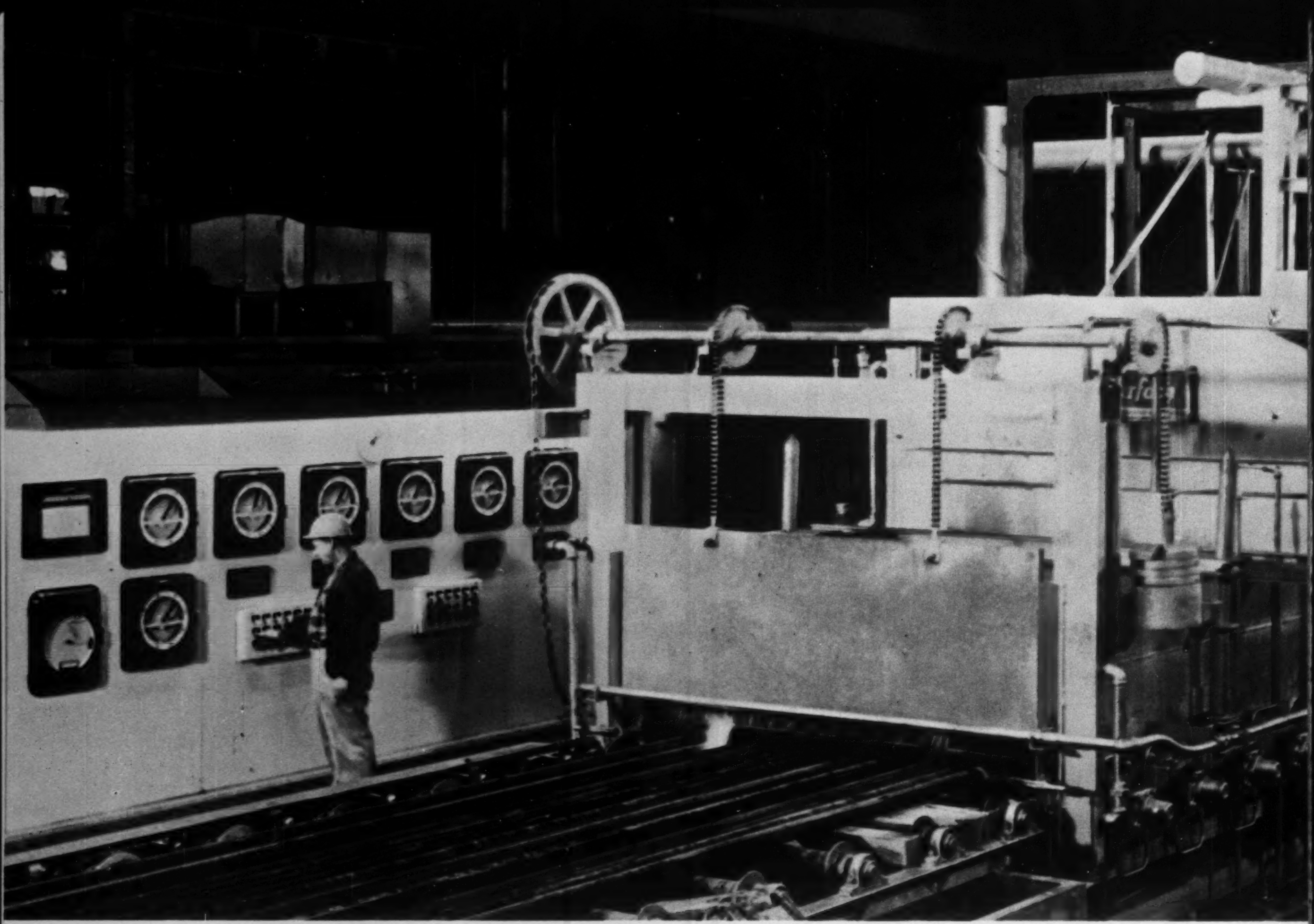

Carbon-restored bars emerge from controlled atmosphere furnace prior to cold drawing.

J&L announces industry's most modern controlled atmosphere furnace for cold finished bars

This new continuous controlled atmosphere furnace is the latest and most important addition to J&L's wide range of heat-treating facilities for cold finished bars. It makes possible a major increase in production of accurately and uniformly heat-treated cold finished bars — so important to producers of finished parts, who depend upon consistent properties throughout the bar, from bar to bar, and from shipment to shipment. The new furnace provides extremely accurate—yet flexible—control of heating and cooling. Flexibility is made possible by the division of the furnace into several automatically controlled chambers. Bars can thus be treated to match exactly each user's requirements for strength, hardness, and structure. These characteristics can be reproduced throughout different lots of steel. A principal function of the new furnace is carbon restoration annealing; other thermal treatments include bright annealing, spheroidize annealing, and normalizing.

Steel

This Steelmark identifies products made of steel. Place this mark on your products. And — look for it when you buy.

Jones & Laughlin Steel Corporation

3 Gateway Center, Pittsburgh 30, Pennsylvania

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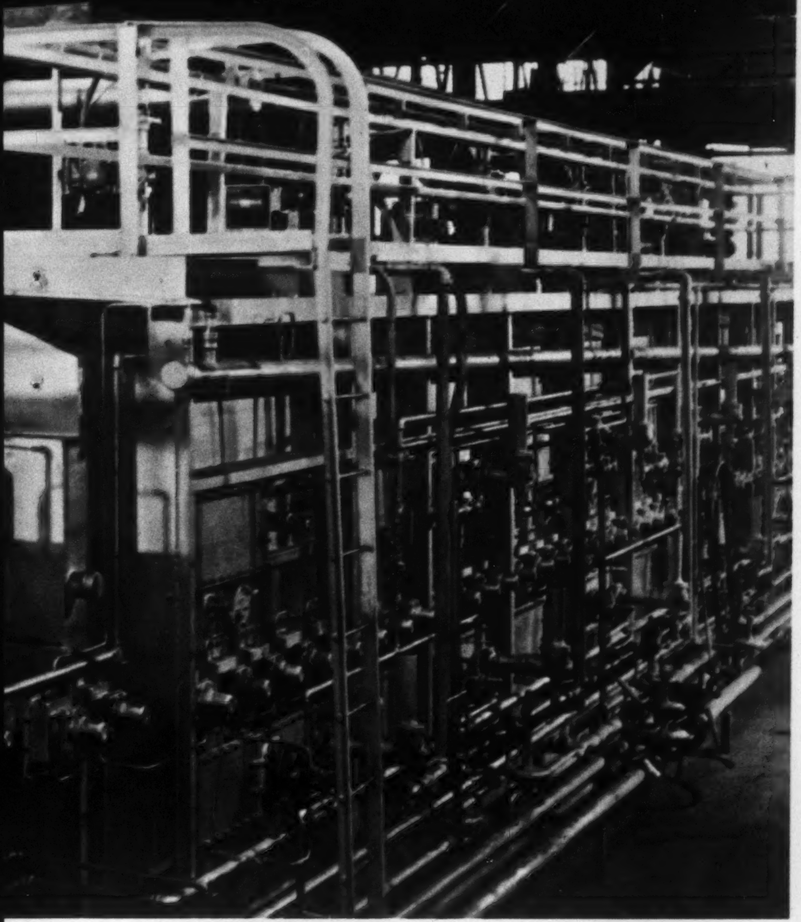
STEEL

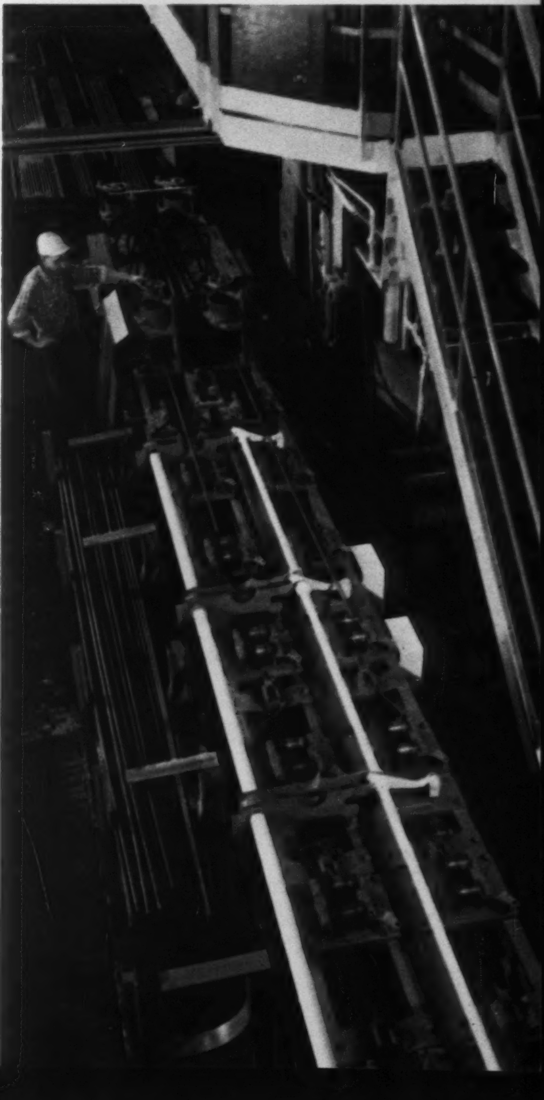


◀

This new continuous controlled atmosphere furnace gives J&L greatly enlarged capacity for precision heat treatment of cold finished bar stock. Automatic control of furnace atmosphere, heating, and cooling results in a very uniform structure for the annealed bars.

Electreat is an exclusive J&L method of heat-treating cold finished bars by exceptionally accurate control of heating, quenching, and tempering. Individual bars are fed continuously through an induction coil, then quickly cooled and tempered to obtain desired mechanical properties or hardness. Electreat gives a high-strength bar with superior ductility and uniform hardness. Improved notch toughness enables parts to withstand shock loads in service; provides greater strength than conventionally heat-treated carbon steel at lower cost than alloy steel for many products.

▼



NEW HOLLAND

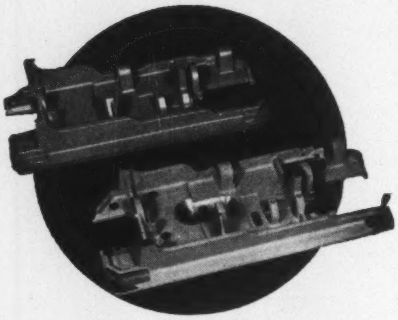
New Holland Machine Company saves on drive shaft cost. By selecting J&L's Electreat C-1144 cold finished bars for the feeder drive shaft of a new hay baler, New Holland Machine Company met high standards for strength while saving money on the cost of the part. Electreat's high minimum yield strength (120,000 p.s.i. required in this case) and uniform hardness eliminated the need to use a larger diameter carbon steel shaft or an expensive alloy steel. Due to the high yield strength and uniform quality of Electreat, New Holland reports very satisfactory field performance from their shafts.

Sub-contracting precision parts, assemblies and machines like these... is our business!

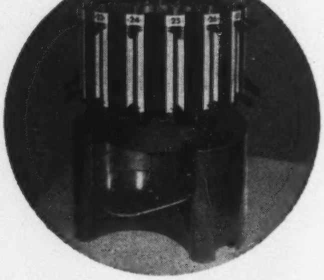
(but we want more of it)

We'd also like to prove to you what our completely integrated manufacturing facilities* can mean to you in terms of lower costs, faster delivery, and complete satisfaction.

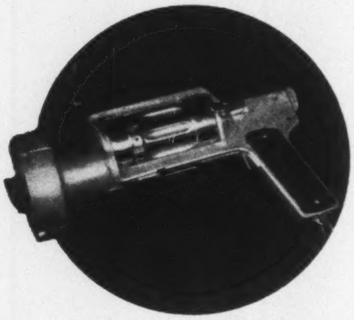
TMW's facilities and 65 years' experience in high-precision (tolerances to tenths) manufacturing are available to you *now,* on a short or long-term basis. For details or a new Facilities File Folder, call or write today.



A TMW gray iron casting before and after precise machining, annealing and finishing operations were performed.



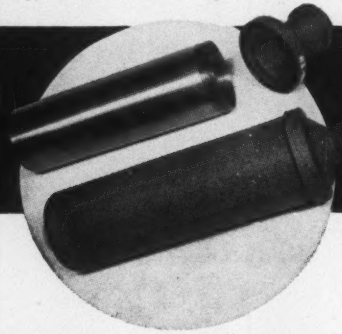
Paint dispenser was economically mass produced for a major manufacturer in TMW's modern shops.



"The world's first and only automatic stud fastener" . . . (another example of TMW precision machining and assembly) carries a LIFETIME guarantee.

TEXTILE MACHINE WORKS

Contract Division • Reading, Pennsylvania



Jato units, used on the "Honest John" rocket to make it spin, are machined to ±.0002" tolerances and hydrostatically tested to meet strict government specifications.

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*Includes 1,000,000 sq. ft. of manufacturing space, 1200 *modern* machine tools, completely mechanized foundry (one of the world's largest), 3000 skilled craftsmen with a corps of top designers and engineers.

New from Wright!

Built-In Overload Protection for Operator, Load and Hoist with the New Wright Overload Cutoff*!

WRIGHT
WRIGHT
OVERLOAD CUTOFF

• Now, for the first time on any electric hoist, you can have safe, sure, mechanical overload protection as a built-in feature with the **WRIGHT Overload Cutoff.** Designed and built to fit any new WRIGHT *Speedway* Electric Hoist, the Overload Cutoff unit you see pictured above is a compact, integral part of the hoist frame itself. As a result, it becomes a functional part of the hoist *at no sacrifice in headroom.* The WRIGHT Overload Cutoff is simple in design and should give dependable, trouble-free operation during the entire life of the hoist under normal operating conditions. Calibrated and sealed at the factory for the user's protection, the unit takes rugged abuse up to the critical point of overload—then instantaneously "breaks" the raising circuit of the hoist. This allows the load to be safely lowered to the floor and unhooked. Once this is done, the raising circuit of the hoist is again automatically restored.

The WRIGHT Overload Cutoff is available now as standard equipment on all new WRIGHT Frame 2 & 3 *Speedway* Electric Hoists, and as optional equipment on new Frame 1 & 1½ models.

Find out how WRIGHT *Speedway* Hoists equipped with Overload Cutoff can bring practical, fast-acting overload protection to your material handling operations. For complete information, write our York, Pa., office.

*Patent applied for

See your WRIGHT Distributor
about the Speedway Electric Hoist line or write us for Catalog E-58

WRIGHT HOISTS

Wright Hoist Division • American Chain & Cable Company, Inc.
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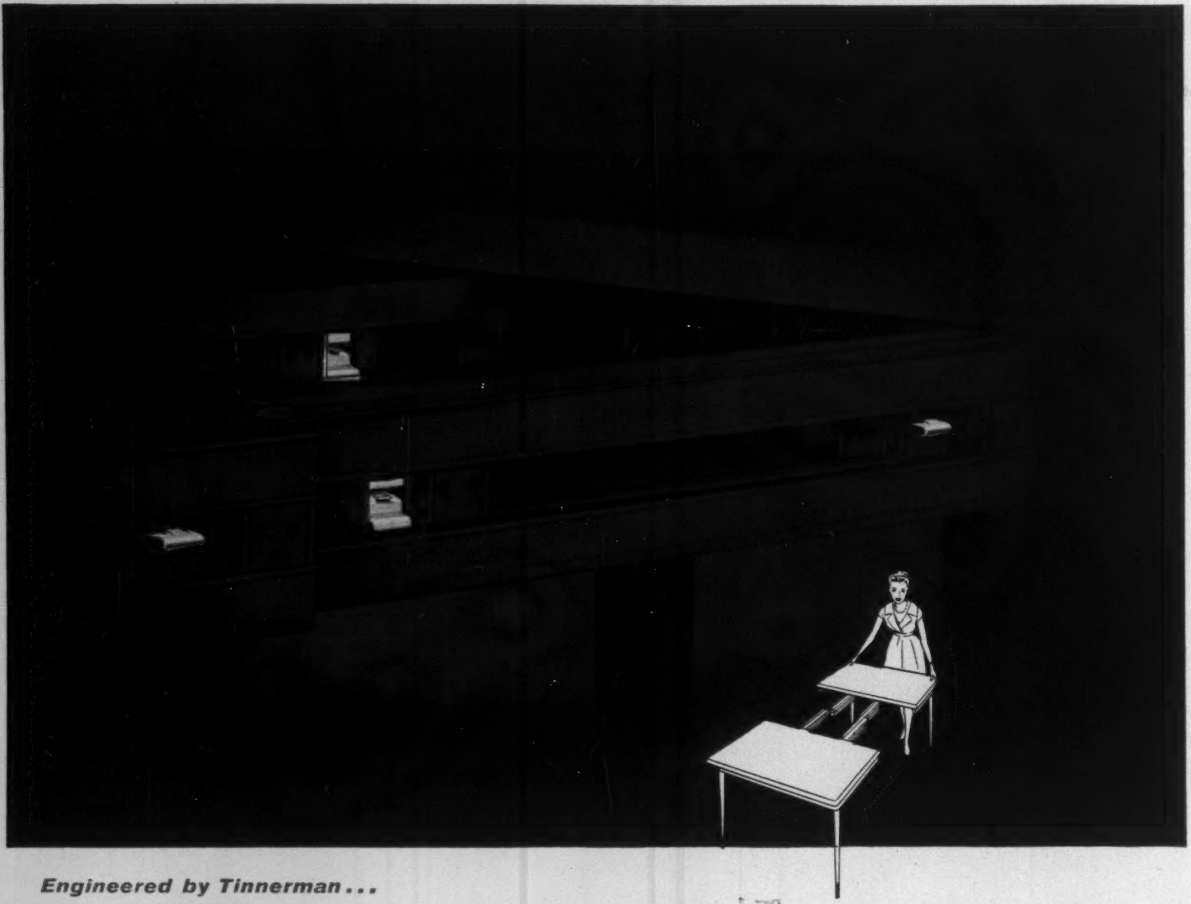
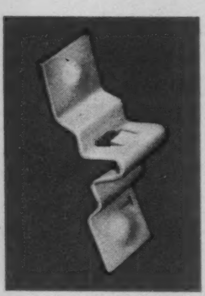
ACCO
TRADE MARK



Engineered by Tinnerman . . .

SPEED CLIP® replaces three parts on table-slide . . . rate of assembly increased by 50%!



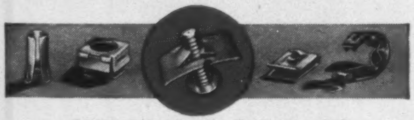
New all-steel nonbinding slides made by Watertown Table-Slide Company are now assembled faster, better! One Tinnerman SPEED CLIP replaces three separate parts used in earlier designs and produces double-header savings for Watertown.

This special spring steel SPEED CLIP holds the slides together firmly, yet lets them slide easily without binding. One quick stroke with an ordinary mallet seats and locks the SPEED CLIP in place. Long service life without loosening or sagging is assured.

Savings and assembly advantages like these are possible on your product too. Call in your Tinnerman representative and let him show you how. He can acquaint you with the 10,000 variations of SPEED NUT Brand Fasteners bringing similar benefits to manufacturers everywhere. He can also arrange for a FASTENING ANALYSIS of your product. This no-charge service has saved industry millions of dollars. Why not see what it can do for you? Tell us when you would like to have him call.

TINNERMAN PRODUCTS, INC.
Dept. 12 • P. O. Box 6688 • Cleveland 1, Ohio

TINNERMAN
Speed Nuts®



FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano-Bundy GmbH, Heidelberg.

FATIGUE CRACKS

What Happens When You Get Buc Fever?

Just about everyone knows what happens when a hunter gets "buck fever." But what happens when an entire city gets an equally strange, and infinitely rarer, malady called "Buc Fever?"

It was 1927 when the hometown archers, the Pittsburgh Pirates (or Buccaneers) last stalked an elusive adversary through the haze of the Smokey City. After four straight misses their bow came unstrung and the foe escaped with the prize and the title of World Champions of Baseball.

At Last—For 33 years the good burghers of Pittsburgh waited for their champions to get their bows restrung. This year they made it. The quarry hadn't changed—once again it was the New York Yankees of the American League.

Good reporter that he is, George McManus, our Pittsburgh editor, sent us his eyewitness account of a city caught in an epidemic of "Buc Fever."

Baseball Capacity—100 Pct—The slowdown in steel operations was forgotten for a while as commercial activity ground to a halt. One bank closed for the duration of the Series. TV sets sprang up in offices like potted plants in a greenhouse. There were enough betting pools so that every working man and woman must have won at least once.

Perhaps fearful that it might be another 33 years before the local roundballers would again be so successful, the city made the most of it. Get-rich-quick schemes poured from ingenious minds bent on turning a buck on the Bucs.

Businesses and salesmen scrambled for tickets, bidding up the already inflated scalpers' prices.

For The Boys—Companies unable to get enough tickets to meet the demand set up hospitality suites. Crucible Steel Co. took over a ballroom in one of the leading hotels, changed it into the "Quench Room." At noon on the day of games in Pittsburgh the company held a drawing for available tickets.

Pittsburgh Steel Corp. took over the newest, and plushest, restaurant in town as a place where the disappointed could at least watch the games on TV in comfort.

Exit of a Salesman—Hardened steel salesmen, survivors of business feasts and famines, were reportedly seen sneaking out of town, victims of an incurable problem: How to find room among the 38,000 seats and standing places of Forbes Field for their customers when more than 2 million other citizens of the metropolitan area were also trying to get into the arena.

Tickets for games were doled out first to season ticket holders; then the club held a giant lottery. Lucky winners got two tickets for one game.

A salesman latched on to 27 tickets, promptly wished he hadn't. Which customers should get them? On what day? And how to avoid alienating good friends?

What Price Glory? — Another salesman observed that the Series probably caused more ill will at a higher cost than any recent event.

Despite the problems of the businessmen, Pittsburgh made the most of the rare event. "Beat 'em Bucs" bumper signs blossomed out in eight languages, including Chinese. Hotels raised their rates. Parking lots near the ball park boosted the fee to $5 from the usual $1. There were parades and, on the eve of the first game, a campus-type pep rally.

Brewing Ill Feelings—Two breweries went to court over the Bucs. One, which regularly sponsors broadcasts and telecasts of the Bucs' games, recently came up with a new "Beat 'em Bucs" theme song. A competing brewer brought out a new beer—BUCcaneer. The first brewer objected.

And so it went. And so did our editor. George was one of the lucky few to attend the opening game.

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ROLLED HIGH CARBON STRIP STEEL

COMING EXHIBITS

Metal Show—Oct. 17-21, Convention Hall, Philadelphia. (American Society for Metals, Metals Park, Novelty, O.)

Die Casting Exposition & Congress—Nov. 8-11, Detroit Artillery Armory, Detroit. (The Society of Die Casting Engineers, 19382 James Couzens Highway, Detroit 35.)

Western Tool Show—Nov. 14-18, Memorial Sports Arena, Los Angeles. (American Society of Tool and Manufacturing Engineers, 10700 Puritan Ave., Detroit 38.)

Power and Mechanical Engineering Show—Nov. 28-Dec. 2, Coliseum, New York. (American Society of Mechanical Engineers, 29 W. 39th St., New York 17.)

MEETINGS

OCTOBER

Non-Ferrous Founder's Society—Annual meeting, Oct. 13-15, Grove Park Inn, Asheville, N. C. Society headquarters, 1604 Chicago Ave., Evanston, Ill.

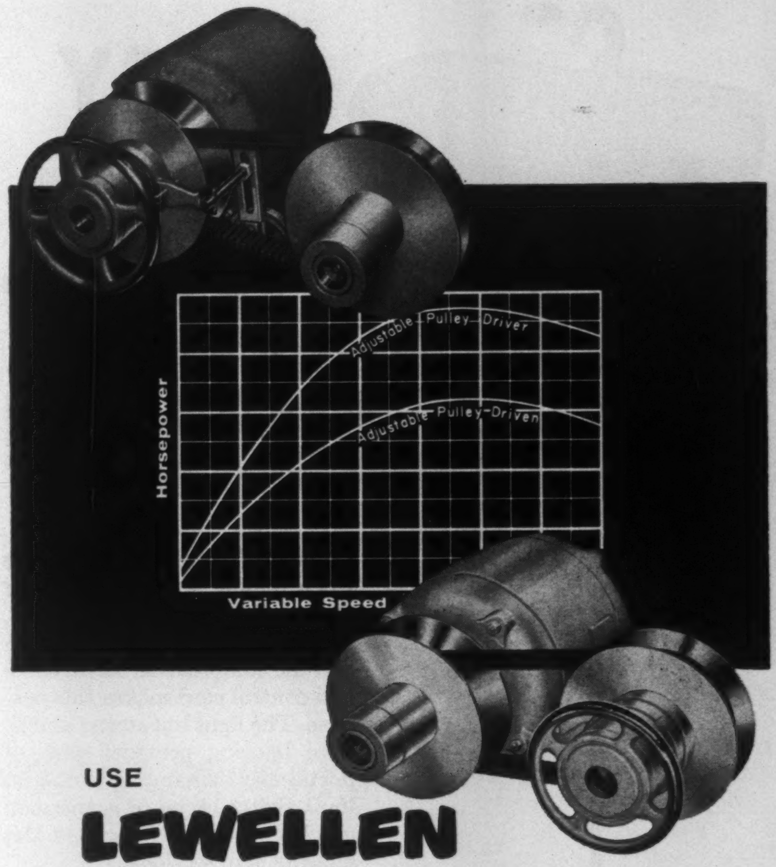
Magnesium Assn. — Annual convention, Oct. 17-18, Cleveland. Association headquarters, 122 E. 42nd St., New York.

American Coke & Coal Chemicals Institute—Annual meeting, Oct. 17-18. The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 711 14th St., N. W., Washington, D. C.

Society for Non-Destructive Testing—20th Annual convention, Oct. 17-21, Philadelphia. Society headquarters, 1109 Hinman St., Evanston, Ill.

The National Society of Professional Engineers — Fall meeting, Oct. 19-21, Statler-Hilton Hotel, Denver, Colo. Society headquarters, 2029 K St., N. W., Washington 6, D. C.

National Tool & Die Mfrs. Assn.—Annual convention, Oct. 19-23, Leamington Hotel, Minneapolis. Association headquarters, 907 Public Square Bldg., Cleveland.



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VARIABLE SPEED DRIVES AS YOU CHOOSE

Where there is a motor near the driven shaft, LEWELLEN Combination Pulleys connect the drive and incorporate variable speeds.

Any convenient arrangement of the drive may be used.

Two of several choices are illustrated – mounting the handwheel controlled Pulley either at motor shaft or driven shaft.

Either obtains the same variable speeds at the driven shaft.

Horsepower characteristics are similar, but capacities are not equal, as the graph shows.

How you use LEWELLEN Pulleys determines their performance.

An informed choice can be made by evaluating available performance data.

Write for Catalog 70

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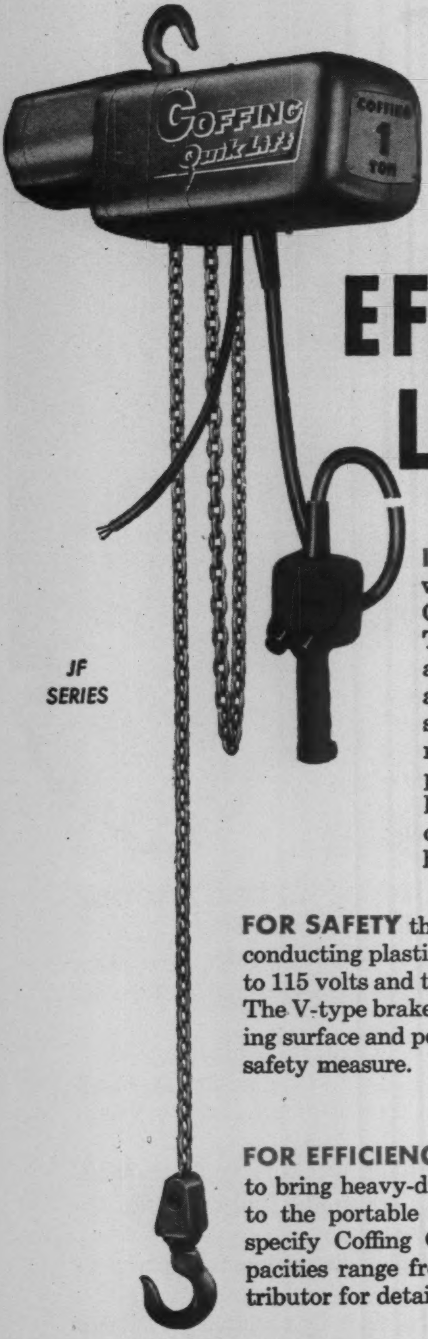

EASY SAFE EFFICIENT LIFTING!

IT'S EASY to raise or lower loads while pulling a trolley mounted Coffing Quik-Lift Electric Hoist. The pistol-grip control station and the combination strain cable and control cord makes this possible. The light but strong aluminum housing provides ease of portability. Changing voltages, limit switch, type of suspension or chain is quick because the housing is in sections.

FOR SAFETY the control station is made of non-conducting plastic in which the voltage is reduced to 115 volts and the push-buttons are interlocked. The V-type brake which provides maximum braking surface and positive control of loads is another safety measure.

FOR EFFICIENCY this hoist has been designed to bring heavy-duty performance plus durability to the portable hoist field. It will pay you to specify Coffing Quik-Lift. Twenty models—capacities range from ¼ to 2 tons. Ask your distributor for details or write for Bulletin ADH-65.

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Ratchet • Screw
Hydraulic • Worm Gear

MEETINGS

Foundry Equipment Mfrs. Assn., Inc.—Annual meeting, Oct. 20-22, Greenbrier Hotel, White Sulphur Springs, W. Va. Association headquarters, One Thomas Circle, Washington, D. C.

Conveyor Equipment Mfrs. Assn.—Annual meeting, Oct. 22-25, The Greenbrier, White Sulphur Springs, W. Va. Association headquarters, One Thomas Circle, Washington, D. C.

Truck Body & Equipment Assn., Inc.—Annual convention, Oct. 24-26, Hotel Sherman, Chicago. Association headquarters, 1616 K St., N. W., Washington 6, D. C.

American Gear Mfrs. Assn.—Semi-annual meeting, Oct. 24-26, Edgewater Beach Hotel, Chicago. Association headquarters, One Thomas Circle, Washington 5, D. C.

Assn. of Consulting Chemists & Chemical Engineers, Inc.—Annual meeting, Oct. 25, Hotel Shelburne, New York. Association headquarters, 50 E. 41st St., New York.

American Standards Assn., Inc.—National conference on standards, Oct. 25-27, Sheraton-McAlpin Hotel, New York. Association headquarters, 70 E. 45th St., New York.

The Galvanizers Committee, American Zinc Institute—Meeting, Oct. 27-28, Onesto Hotel, Canton, O. Institute headquarters, 292 Madison Ave., New York 17, N. Y.

The Assn. of American Battery Mfrs., Inc.—Fall convention, Oct. 27-29, The Palmer House, Chicago. Association headquarters, 19 N. Harrison St., E. Orange, N. J.

National Fluid Power Assn.—Fall meeting, Oct. 30-Nov. 2, The Edgewater Beach Hotel, Chicago. Association headquarters, 5595 N. Hollywood Ave., Milwaukee.

American Institute of Steel Construction, Inc.—Annual convention, Oct. 30-Nov. 3, Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 101 Park Ave., New York, N. Y.

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with Gardner 'grindaway' tape bound cylinder wheels

continuous, uninterrupted production

eliminates operator hazard

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an integral part of wheel

Glass fibre tapes grind away as wheel wears . . . eliminate production stoppages required for removal of wire binding.

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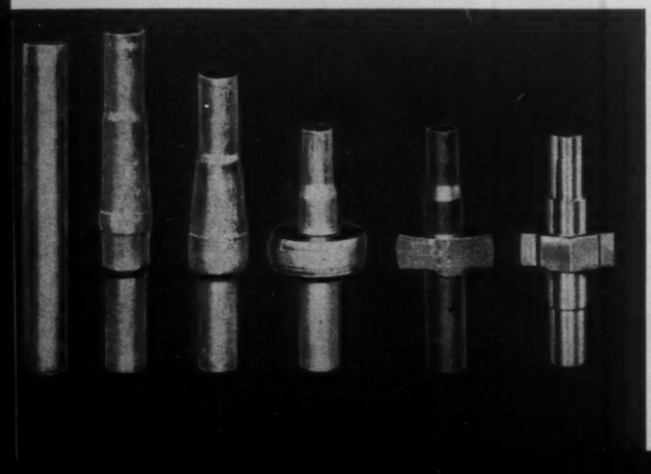
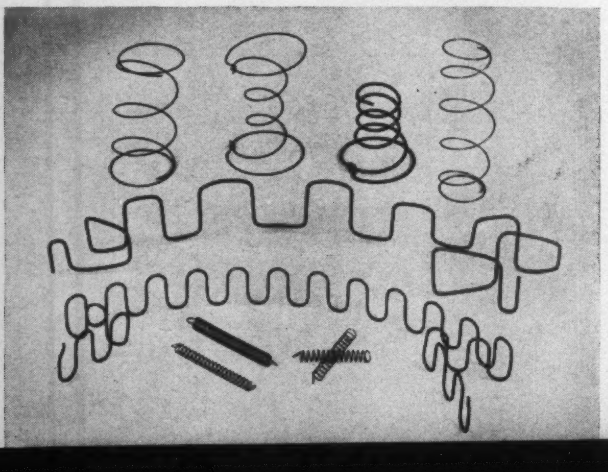
GEAR PRODUCTION COSTS DROP. Producing parts, like the segment gear pictured, by cold heading, cold extrusion, and upsetting speeds production and reduces machining. Steel from Republic's new 11″ bar mill in Chicago is specially suited for this purpose. Advanced features on the new mill assure your bar stock with highly uniform flow characteristics, precise dimensional accuracy, and improved physical properties. Send coupon for more information on Republic cold extrusion and cold heading quality steels. Photo courtesy of National Machinery Company, Tiffin, Ohio.

MEETING DESIGN REQUIREMENTS: Republic Steel Wire has the necessary strength, ductility, and toughness for difficult forming operations. Republic produces many types for virtually any application: Manufacturer's Coarse Wires; Spring Wires (Standard High Carbon and MB High Carbon); Screw, Rivet, and Heading Wires. Republic wire metallurgists are at your service — ready to provide obligation-free assistance in the selection, application, and processing of wire to best meet your requirements. Mail coupon for details.





THE REPUBLIC MIDLAND WELD NUT

Providing you with the best fastener for every job ... that's the objective of Republic's Bolt and Nut Division. Newest addition to the more than 20,000 different types and sizes of standard Republic Fasteners ... the Republic Midland Weld Nut.

Orginated and marketed by Midland-Ross Corporation, this top quality weld nut has been widely used for years by major manufacturers in many fields. Now, as a product of Republic Steel, it will continue to be made to the same high performance standards that have earned a reputation for consistent dependability.

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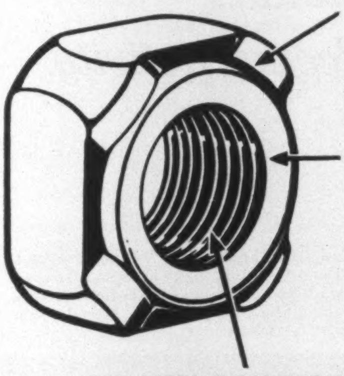

FOUR PROJECTIONS, rather than the three found on many competitive nuts, mean a more secure weld, assures level position, eliminates cross-threading.

CIRCULAR PILOT guides the nut rapidly and accurately into position, simplifies automatic feeding operations, protects threads from any possible weld spatter caused by improperly regulated welding equipment.

FULL DEPTH THREADING for maximum holding power. Close fitting unions anchor bolts for the life of the product, even under severe vibration.

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PROVED DESIGN FEATURES mean fast, accurate positioning; more positive weld; sure holding power; and one man application makes this new Republic fastener ideal for the fabrication, fastening, or assembly of metal parts.

Republic Weld Nuts save time and money, solve many difficult design and assembly problems. Applied quickly and easily by any standard projection welding machine of proper capacity. For high speed operations, welding machines with automatic feeds are suggested. Mail the coupon for more data on the Republic Midland Weld Nut and its application for your products.

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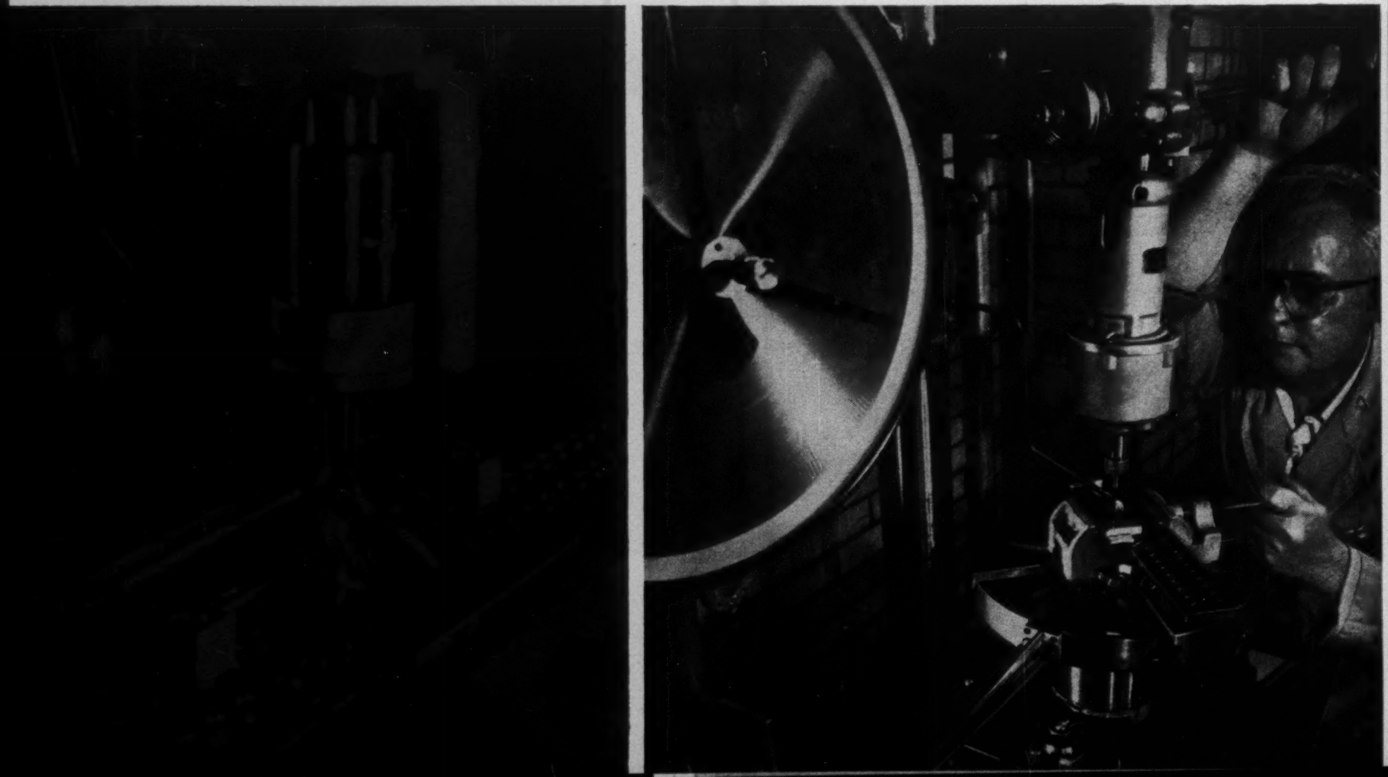
the first multi-metal cutting fluids...
with unique pressure-temperature selective activity.

This Tapping Efficiency Tester is one of many Mobil research tools used in the development of cutting fluids such as Mobilmet . . . effectively evaluates the machining efficiency of cutting oils on soft, draggy SAE 1020 steel. On this difficult machining operation as well as in field service, Mobilmet oils have demonstrated results better than conventional cutting fluids intended for this application. Other applications for new Mobilmet oils include: Turning, Drilling, Boring, Milling, Gear Hobbing, Shaping and Shaving, Threading, Tapping, Pipe Threading, Surface and Internal Broaching, Thread and Form Grinding, Thread Rolling, Forming and Special Automatic Screw Machine Operations.



in cutting-oil technology...

Now . . . from Mobil Research . . . versatile new cutting fluids that offer you: • greater machine output • lower tool costs • reduced loss from rejects . . . over wide ranges of metals and operations!

Now, after two years of exhaustive research and field testing . . . new Mobilmet* oils—the first multi-metal cutting fluids ever offered to the metalworking industry.

Mobilmet oils are uniquely versatile . . . help simplify your cutting oil requirements because each grade is effective over ranges of metals and operations beyond the capacity of any conventional product. And Mobilmet oils offer you superior machining results as well—in terms of improved finishes, longer tool life, and reduced staining.

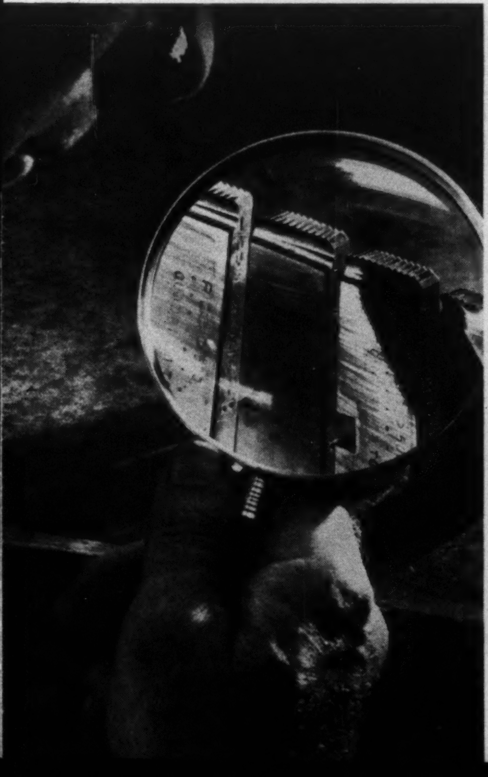
Behind this versatility and effectiveness: a new additive composition, developed and patented by Mobil, which is *pressure-temperature selective* in its activity—highly effective over the wide ranges of cutting pressures and temperatures produced in machining various metals with greatly different physical characteristics. As a result, Mobilmet oils are useful for both tough, draggy metals and hard, brittle metals.

Call your Mobil Representative, or use the coupon below.

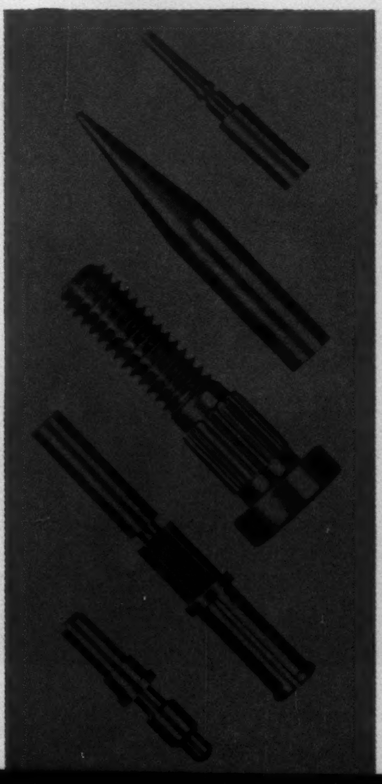
*Mobilmet is a trademark of Socony Mobil Oil Company, Inc.

MOBIL OIL COMPANY, 150 East 42nd Street, New York 17, N. Y.

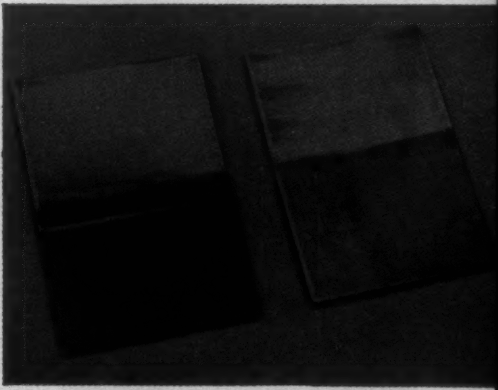
Mobilmet oils offer superior tool life on both soft, draggy metals and hard, clean-cutting materials. These pipe threading chasers used for six weeks in moderately severe job-shop service show little wear on either tool faces or thread crests. Results were achieved with heavy-duty Mobilmet oil.



Since they effectively control built-up edge and tool wear, Mobilmet oils provide superior finishes that meet exacting specifications—with fewer rejects, and in some cases reduced necessity for additional finishing operations.



Stain-inhibiting effect of new additive combination is demonstrated with two steel plates. Plate on the left was immersed in conventional corrosive cutting oil; plate on the right was immersed in heavy-duty Mobilmet grade intended for the same application. Re-polished tops of plates show original condition.



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A Division of Socony Mobil Oil Company, Inc.
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Gentlemen: I am interested in learning how Mobilmet oils can improve metal-cutting operations at my plant. Contact me about setting up an evaluation program.

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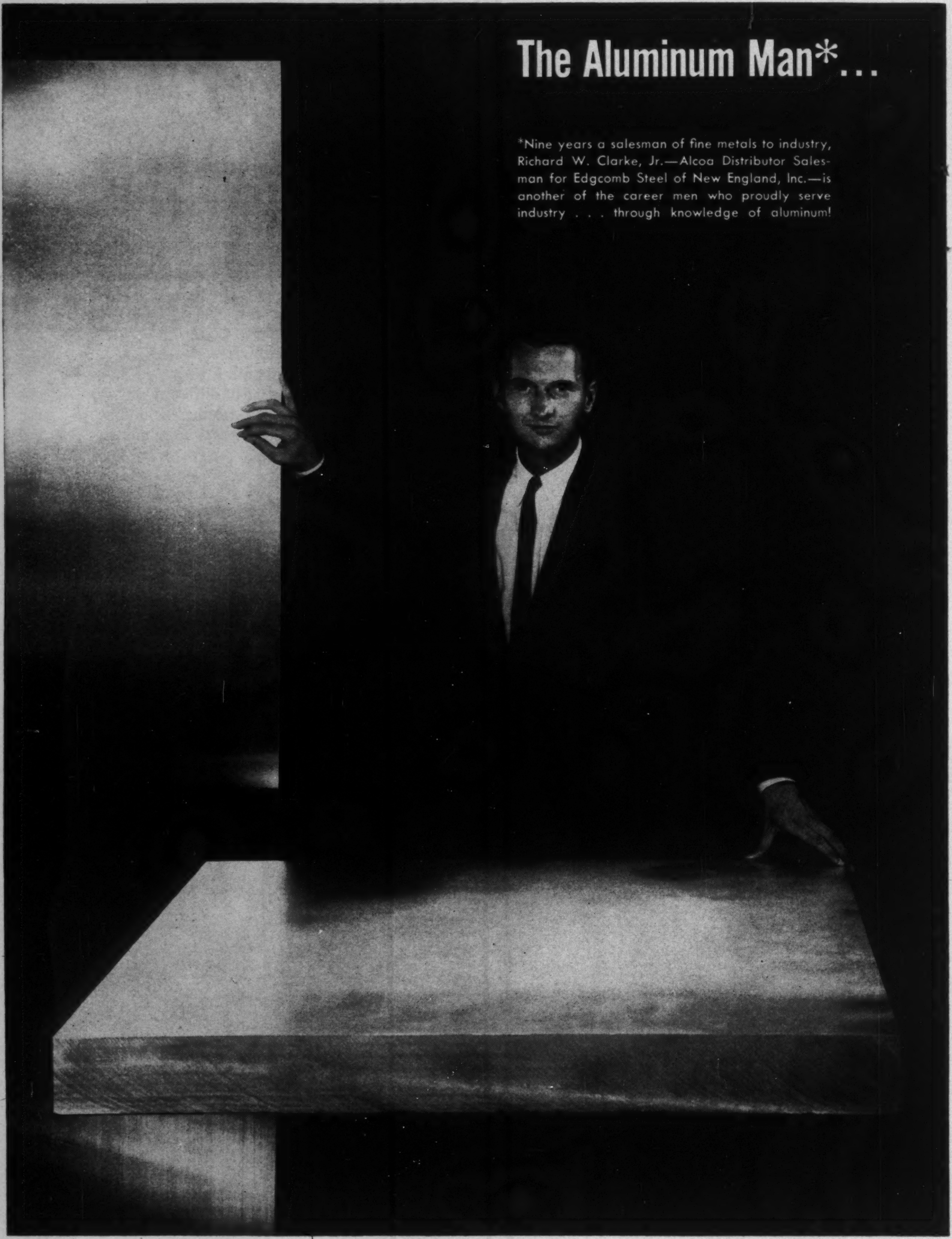

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North Kansas City 16
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(Grand 1-3505)
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*Metal Goods Corp. (Harrison 7-1234)
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*A. M. Castle & Co.
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(Axminster 4-1623)
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(Greenwood 5-8661)

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Portland 9
*Pacific Metal Co. (Capitol 7-0693)

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Metal Goods Corp. (Fleetwood 1-3271)
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(Parkway 5-1500)
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Pacific Metal Co. (Main 2-6925)

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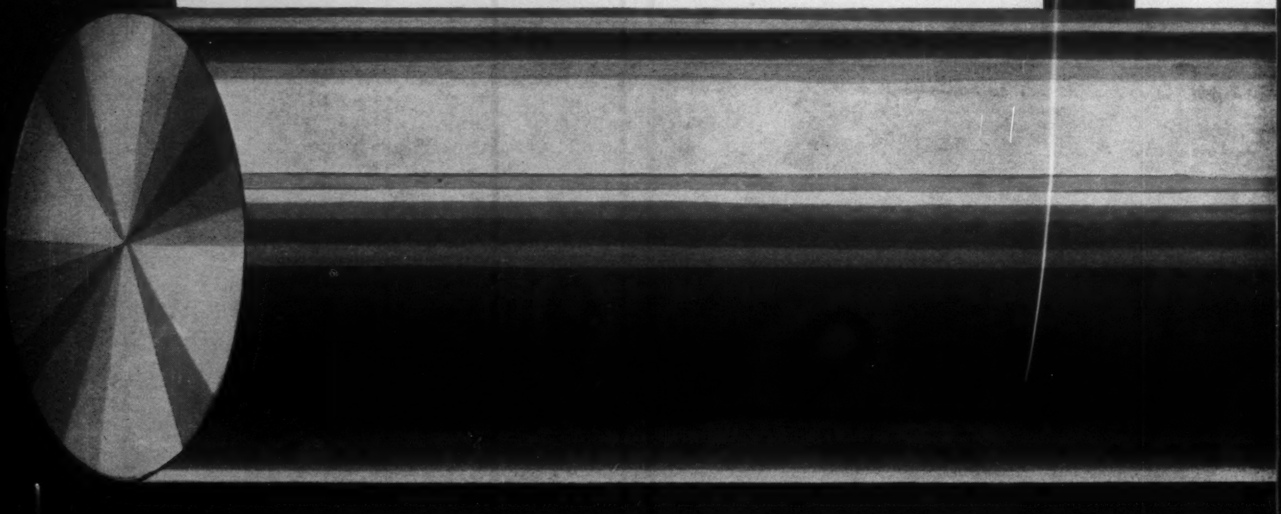

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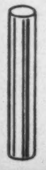

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Elongation—Approx. only	10% -20%
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Brinell Hardness Number	302 minimum*
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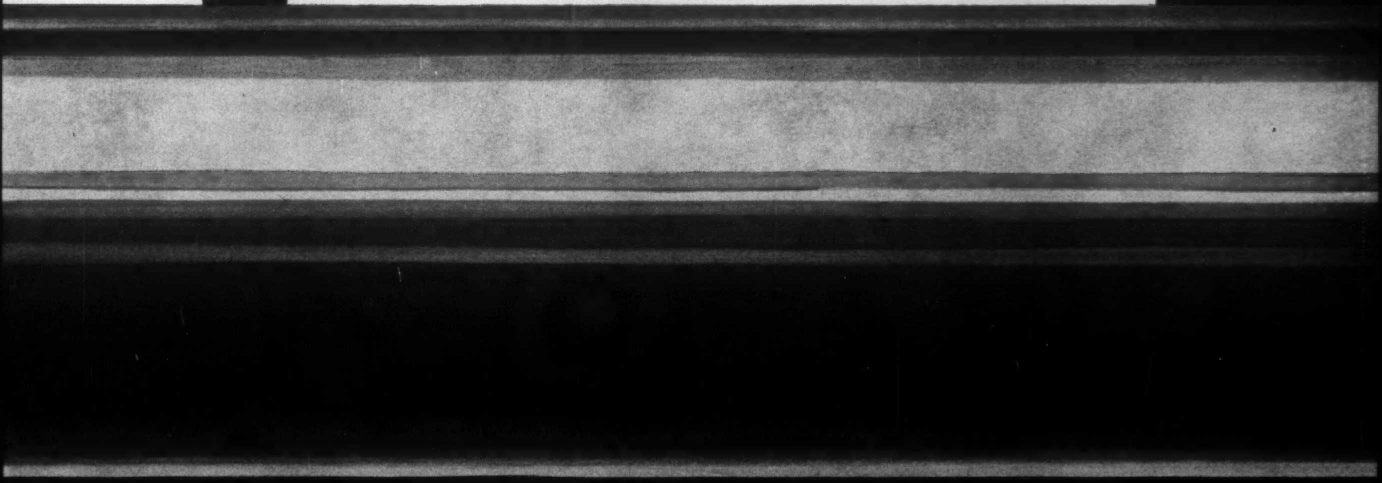

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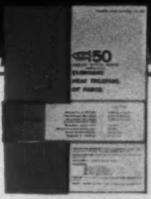

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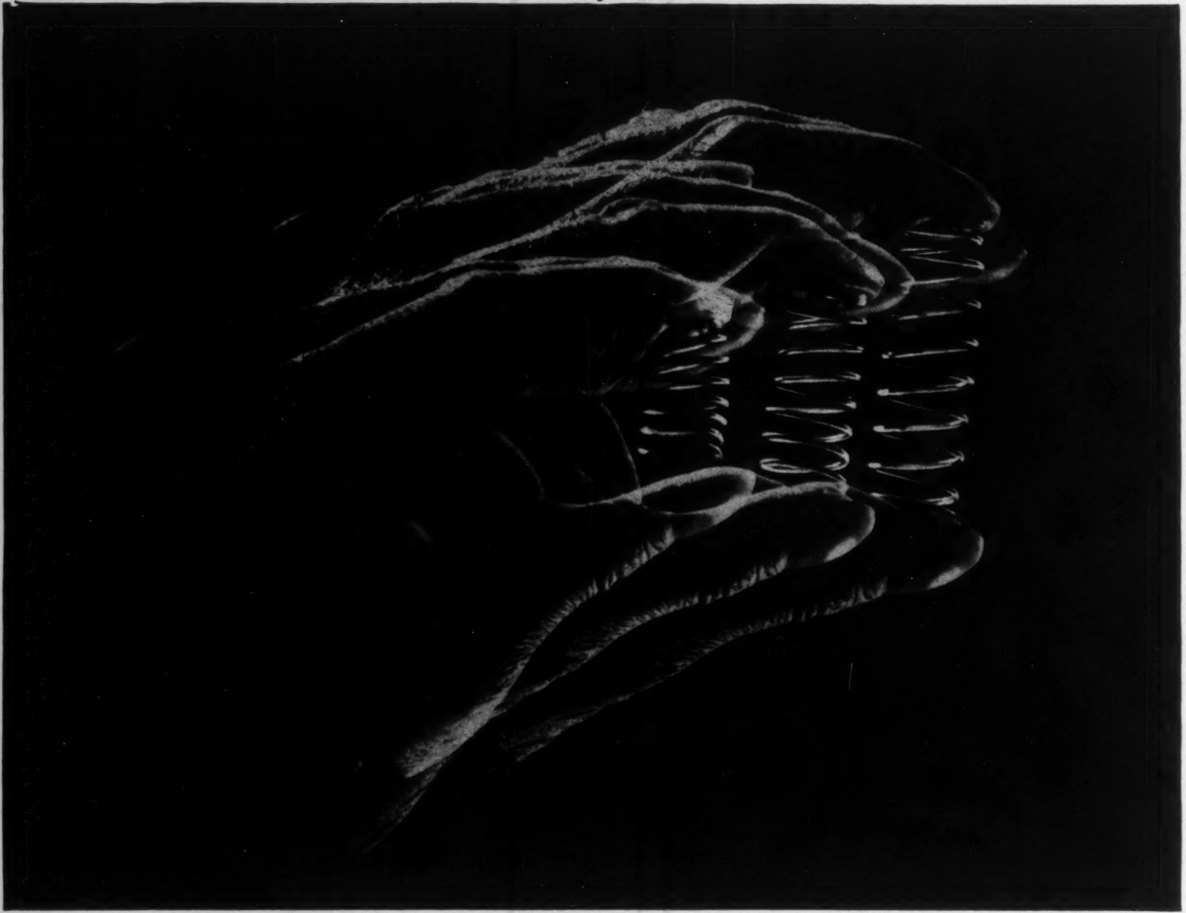

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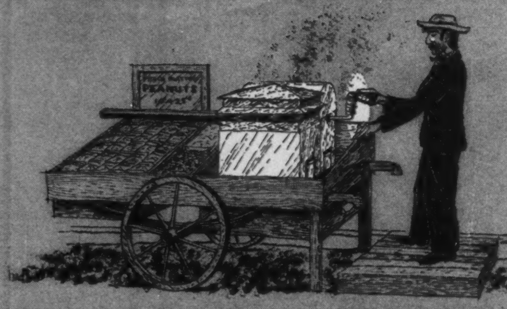

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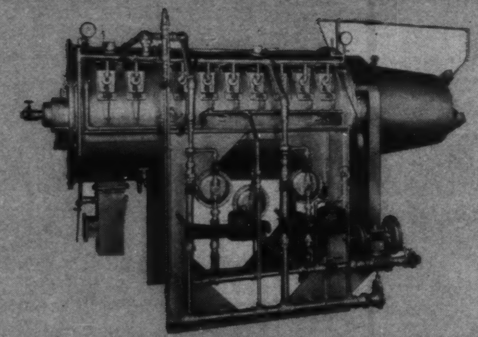

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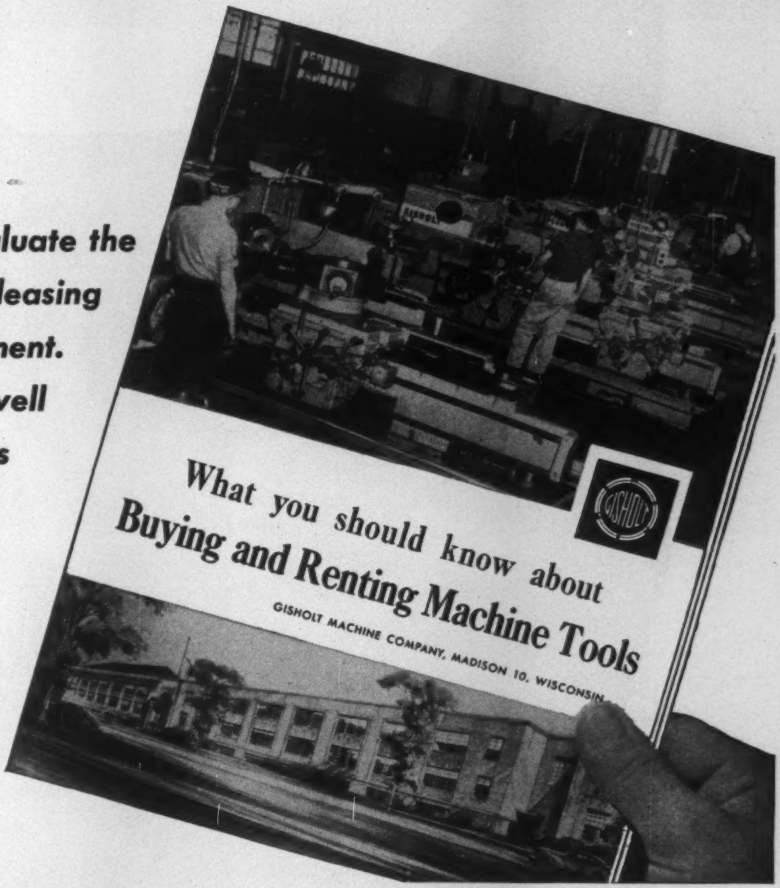

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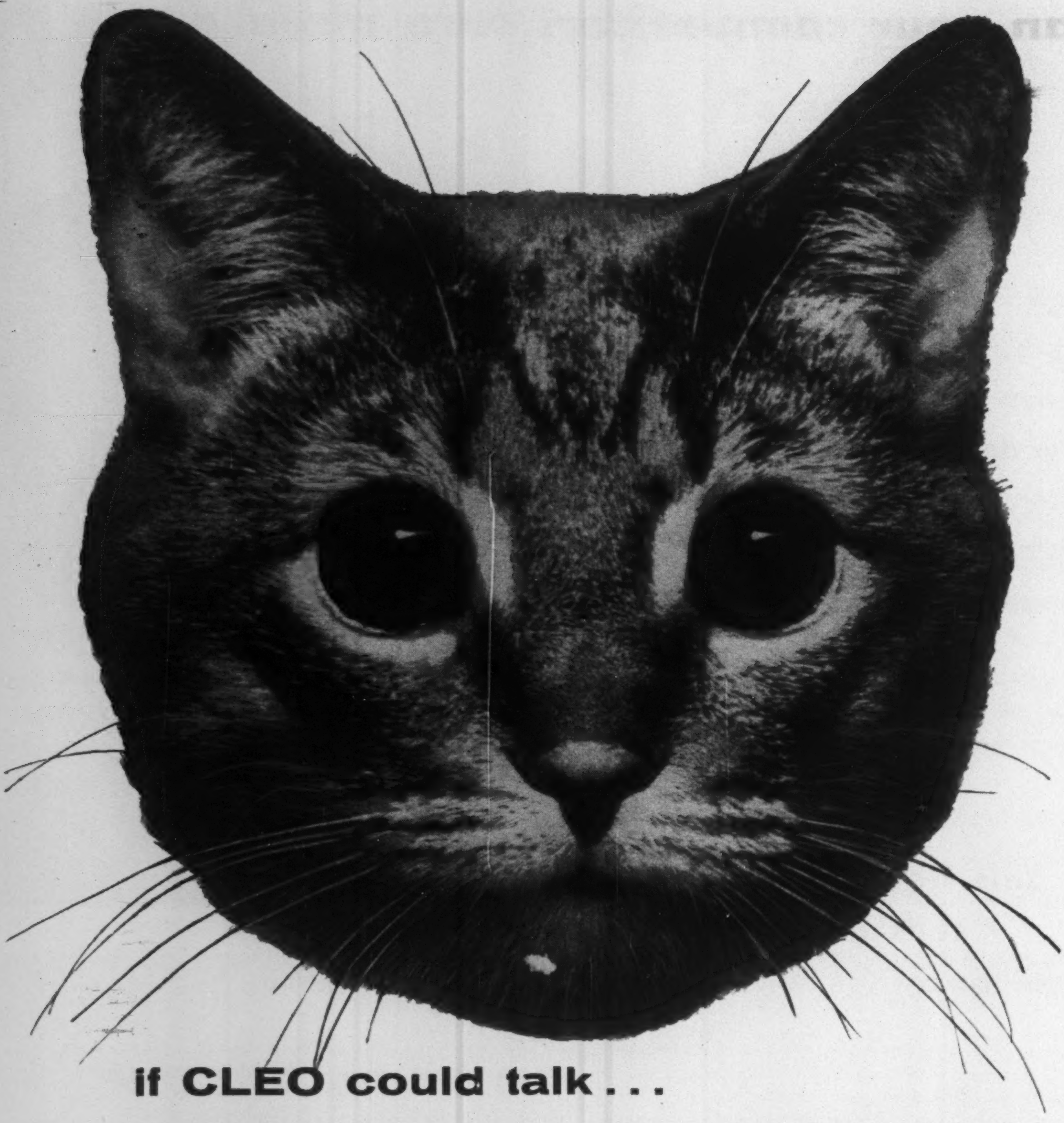

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BUYERS REPORT ON SALES EFFORTS in September survey of the National Association of Purchasing Agents. They say "keen competition is resulting in sales at substantially below book or list figures." Also, that selling stress is being placed on quality, with idea that better materials help lower production costs.

TAKE A HARD LOOK AT SPACE CONTRACTS before you jump. Top experts on materials and products requirements on space contracts caution: Companies interested in getting space contracts should look for high-requirement items in the space program sufficiently like their own product line so they can produce it in fair quantities at a fair profit. P. 52.

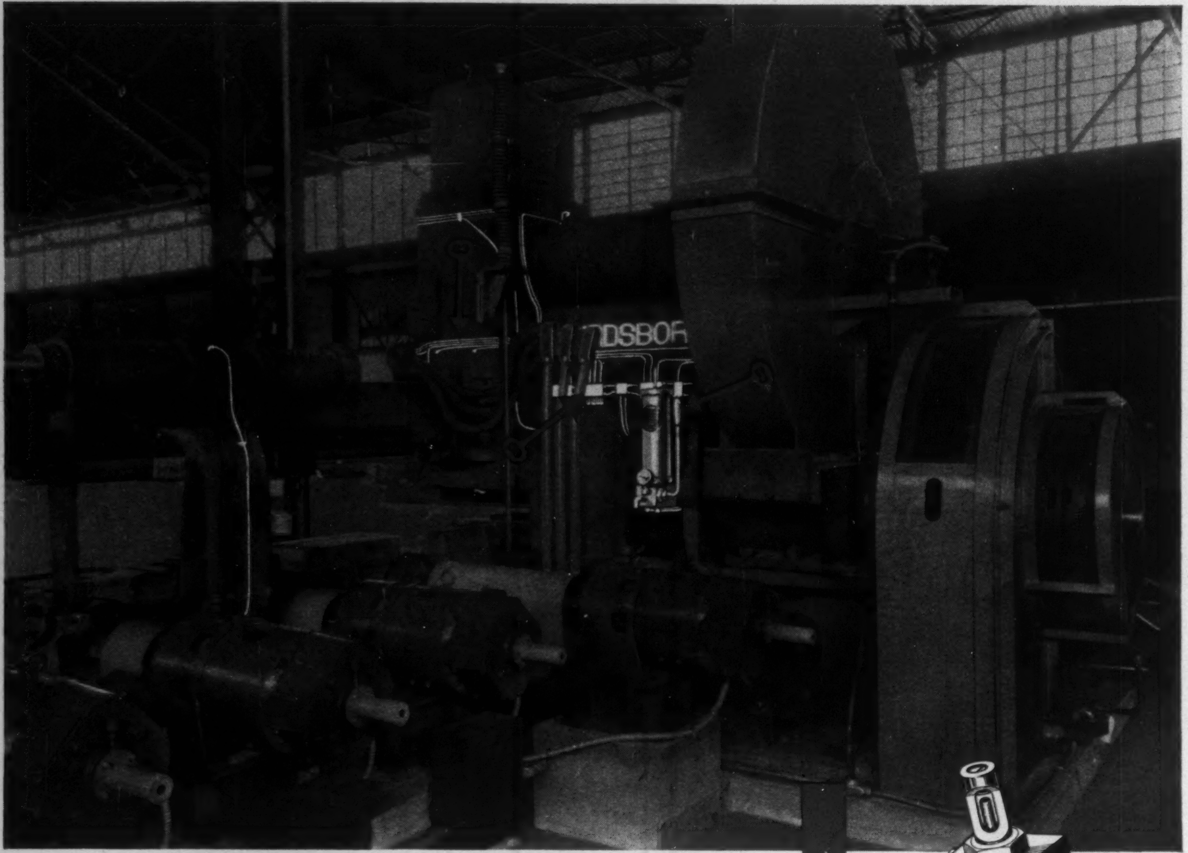
ALUMINUM IN HOME BUILDING is expected to climb rapidly. Part of the gain is due to big increase in aluminum company advertising budgets and an intensified marketing program. One estimate: In 1960, average use of aluminum in a new home is 260 lb; in 1965, use in a new home is expected to total 750 lb.

U.S. CONSUMERS ARE IN GOOD FINANCIAL SHAPE, says the National Consumer Finance Association. Consumers have total assets of $1,540 billion, and liabilities of only $173 billion. This net worth of $1,367 billion is a record high.

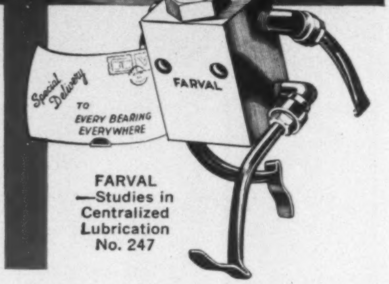
INVENTORIES ARE STILL KEY FIGURES FOR MARKETERS to watch. The summer period has shown a shift in inventories from a mere slowdown in accumulation rate to an actual net liquidation of stocks. Says Morgan Guaranty Trust: "Should liquidation cease—still a definite possibility—the business outlook would improve.''

RAIL CAR BUILDERS LOOK TO A BIG MARKET in public transportation as 30 U. S. and Canadian cities approach population levels to support transit systems. This $1.5 billion market could develop in the next 10 to 15 years, according to Oliver Hamilton, Budd Co. corporate economist. An equal expenditure for replacements is due in other cities.

HOLD YOUR FUTURE MARKETS with an intensive product research program, advises D. C. Power, board chairman of General Telephone and Electronics Corp. U.S. industry is investing $8 billion in research this year. Says Mr. Power, in a marketing quote-of-the-week: "This is more than investing in the future. It is the only way a company can assure that it will have a future."



Farval centralized lubrication protects 24 vital bearings on Birdsboro cold bar shear



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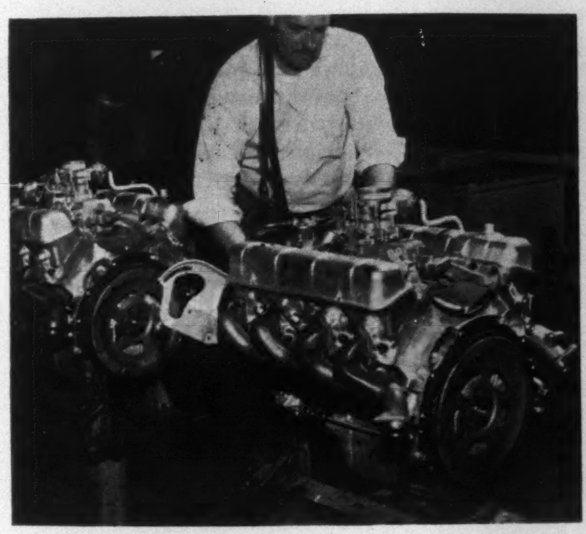
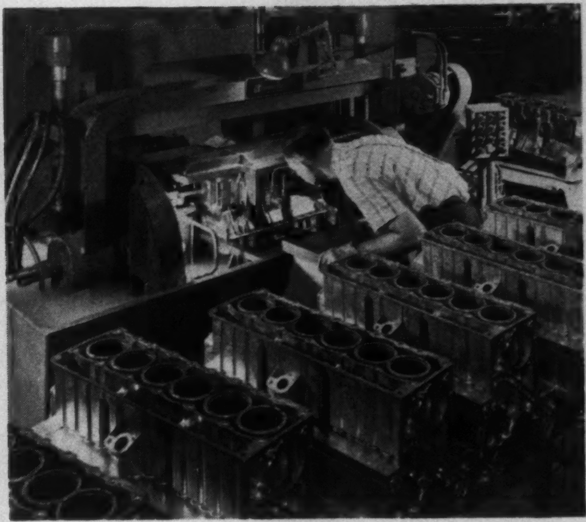


SOMETHING SPECIAL: New aluminum V-8 engine for the Buick Special weighs about 325 lb, compared with 600 lb for a similar engine of cast iron.



UNDER PRESSURE: Aluminum engine blocks, die-cast for American Motors by Doehler-Jarvis, are pressure tested in a specially developed machine.

New Materials Shape Fashions Of Tomorrow's Cars

Automakers have changed their ways of thinking and future cars will have many changes as a result.

New materials will play a big part in planning and design of the cars of tomorrow. — By A. E. Fleming.

▪ This week, with most of the 1961 model cars in the showrooms, the auto industry gives them its biggest and splashiest send-off with the opening of the 43rd National Auto Show in Detroit.

Although introduction season always brings tension and anxiety to the automakers, this may be the most critical year since the introduction of the Model A Ford. It marks a unanimous reversal of the philosophy that carried the industry through the 1950's.

A year of testing the market by Corvair, Falcon, Valiant and Comet has shown buyer appeal for Rambler and Lark compact cars isn't restricted to a small segment of the market. The entire industry is now committed to the trend toward smaller, lighter, and more economical cars.

Change of Mind—Ignoring short-lived ventures of post-war years, it is the first major shift in automotive philosophy in years. While the big cars remain, it's almost a rear-guard action. Over-crowded highways, high maintenance costs, and excessive depreciation dictate the end of the big car as a status symbol.

It's too early to judge the full impact of the new automotive trend. But it isn't too early to assess some of the impact on materials and methods, products and processes that will go into new cars in the years ahead.

Point of Origin—Looking beyond the claims of steel, aluminum, plastic and other materials suppliers and going directly to the auto people for their ideas, this is what seems to be shaping up for the 1960's: A given car will use more aluminum, magnesium and plastics; less cast iron, steel, lead and glass; the same amount of zinc, copper, brass, bronze and rubber.

There is no clearer example of the trend toward lightness than the aluminum engine blocks that are being, or will be, brought out by General Motors, American Motors and Chrysler Corp. in the 1961 model year. This doesn't mean aluminum engines are "in" and cast iron engines are "out."

Says M. F. Garwood, chief engineer of Chrysler Corp.'s Materials Section: "It's too early to make predictions on the aluminum engine. Our 170 and 225-cu in. models are fully developed and tested. But we're feeling our way along, trying to find out if the overall cost of producing the engine is advantageous. At the same time we're trying to judge the full potential of the aluminum engine.

The Considerations—"There are many things to consider. Material handling is different. So are shipping and machining. But, as of today, there seems to be nothing that will keep aluminum engine blocks from going into all cars within a few years."

To show how tentative current plans are, however, the aluminum engine will account for only 10 pct of Chrysler's six-cylinder production in 1961.

From Ford Motor Co., which, with Studebaker-Packard, is the only auto company without an aluminum engine in some 1961 models, comes an even more critical appraisal.

Different Opinion — Says J. R. Forrester, Supervisor of the Materials Development Section: "If we can get engine weight down without using aluminum we'll do it. Why pay a cost penalty just to say we've got an aluminum engine? We'd sacrifice performance and wouldn't have as good an engine as we have now."

Despite its current feeling, Ford Motor Co. probably knows as much about aluminum engines as any of its rivals and has built and tested aluminum blocks of all kinds. If Ford's mind changes it could put through a crash program to bring out such an engine in 1962 cars. But 1963 Ford models probably will have aluminum engines — if they prove successful at GM, AMC and Chrysler.

Follow the Leader — All automakers are preparing to come out with aluminum engine blocks for standard-size cars within two years. But it does not appear any will come out in the 1962 model year except, perhaps a medium-price GM make. The Big Three all are expected to have aluminum V-8s available for their big 1963 models. AMC plans a V-6. And S-P has been querying aluminum suppliers concerning an aluminum engine.

If there is mixed feeling about the aluminum block, there is even more controversy about how to make it. Standard methods are by diecasting; and sand casting.

The Processes — Chrysler Corp. and AMC blocks are die-cast. Chrysler, which gets most of its aluminum from Chryslum Ltd. of Canada, makes its six-cylinder blocks on two big diecasting machines at its aluminum foundry in Kokomo, Ind. AMC's six-cylinder block is built by Doehler-Jarvis Div. of National Lead Co., Toledo, on 2000-ton diecasting machines. GM's V-8s are cast in semi-permanent molds by Central Foundry Div., Defiance O., and machined at Buick's Flint plant.

There is a strong feeling that if aluminum engines are adopted for all cars in the next few years, they will all be diecast. Although initial investment is higher (estimates are $1 million for a block die and a 2000-ton die casting machine), diecasting is said to be cheaper than other methods on a high-volume basis.

A diecasting needs less machining

Materials Trends in Years Ahead

Steel

Use will decline, but not by a phenomenal amount. Three-fourths of a car is now steel. Some parts will yield to plastic. Non-functional parts are most vulnerable.

Cast Iron

Use will drop as other materials are developed that are more suited to compact parts design. New aluminum engines have already made inroads on total cast use.

Aluminum

Gains are coming, probably at a rate between claims made by aluminum makers and counter-claims by steelmen. Trend to aluminum engines will boost overall use in spite of some questions that remain. Exterior use may fluctuate as aluminum and rival metals make progress. Bumpers are a question mark.

Zinc

Should hold its own, although use may also vary from year to year, depending on new developments.

Copper

Radiators and wiring will continue relatively unchanged. Other materials have been looked over, but with little resulting change. More air-cooled engines could cut into radiator use.

Plastics

Use will go way up. In general, plastics are decreasing in cost while materials they might replace are climbing or holding steady. Also, new developments are appearing constantly. Gains will be mostly in interior sections and attachment fittings.

Magnesium

Use should grow. Reduced prices make it more competitive.

Glass

It's up to the stylists. Some feeling is styling has gone too far in recent years in favor of glass and trend will probably reverse.

but presents difficulty in producing a V-8 shape. The six-cylinder blocks of Chrysler and AMC have cast iron heads. GM's V-8 heads are aluminum. Chrysler and AMC are working on aluminum heads and may have them ready for 1962 models. Cost is a main drawback.

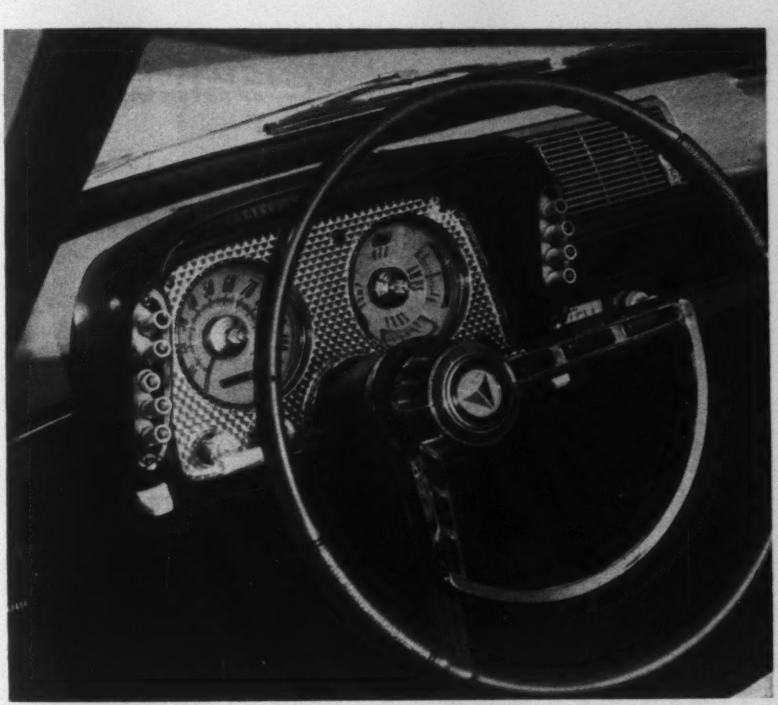
Popularity Poll—GM's use of the semi-permanent-mold again points up the sensitive future of aluminum engines. The company is not sure they will be popular. If they are, GM is expected to invest in diecasting equipment. Estimates are that if GM sells 500,000 aluminum engine cars annually—Specials, F-85's and Tempests (optional)—it would switch to diecasting. If GM turns to diecasting, however, it must completely redesign its aluminum V-8.

Chrysler, GM and AMC aluminum engines all have iron cylinder wall liners cast into the block. They add much weight. AMC's block, for example, weighs 67 lb—53 lb aluminum and 14 lb cast iron liners.

Liners may be used for at least three or four years until a practical way to do away with them is found. If it weren't for them now, an aluminum engine block would have to be made of hyper-eutectic silicon (around 25 pct silicon content compared to Chrysler's 8 pct silicon content), a very hard substance difficult to cast and machine.

Cost Problem — Except for engines, automakers do not see too many more places where aluminum will make great gains in the next few years. According to an automotive metallurgist, "If cost trends continue, aluminum may decline. We won't use aluminum for weight advantage alone. It must also give us a cost advantage or it will start losing out on some parts. Recently, a power steering unit was changed from aluminum to cast iron because we couldn't cast it economically."

He says his company is making evaluations of more than 12 magnesium parts for possible replacement of aluminum. He doesn't see an immediate future for magnesium in engines however. "After all, we're just getting underway on aluminum," he says.



SAVES WEIGHT: Valiant instrument housing, molded of Du Pont "Delrin" acetal resin, weighs 2 lb, compared with 9 lb for a zinc diecasting.

Unthinkable — There is no thought of sheet aluminum replacing sheet steel for general body components. It isn't a logical material for deck and other body panels, for example. There is a price disadvantage too. The same holds true for plastics. It is hard to paint many thermoplastics, and differences in thermal expansion make it implausible to use steel and plastic on the same body.

But mention the possibilities of plastics in car interiors and auto men's eyes light up. They expect great gains in plastics in car interiors for instrument panel sections, ceilings, side moldings, and attachment fittings. They sense that plastics makers are coming up with many more new materials and that prices of plastics will drop while prices of competitive materials will climb.

Bumper Crop—Next to engines, bumpers offer perhaps the greatest auto market potential of any piece of equipment. But steel still seems to hold the inside trend.

An auto engineer whose company was on the brink of using an aluminum bumper claims, "Exhaustive studies show we can't use aluminum to advantage. We don't see how aluminum will be used for bumpers in the next five years. The only real advantage is weight. Cost is higher and performance isn't as good as steel."

There is some thought that bumpers may go to stainless, which would solidify steel's position.

Some Thought—For wheels and brakes, it looks as if it may be rough to beat cast iron, although aluminum disk brakes have been adopted by some manufacturers. Impact-extruded aluminum wheels reportedly are being worked on.

Auto men say steel can't be beaten in suspension systems although rubber and rubber-like compounds are getting greater play for many types of mountings and suspensions.

Stainless steel is the automaker's ideal for exhaust systems. They wish steelmakers could come up with a stainless material at the low enough price to consider in high production runs. They claim they are satisfied with aluminized mufflers. But Rambler's ceramic coated steel muffler is drawing interest.

The Hard Sell at Hannover

Report on Europe

This is the first of a series of on-the-spot reports by G. F. Sullivan, editor of The IRON AGE, who recently completed his sixth peacetime visit to Europe.

▪ If ever there was any lingering doubt about the power of the West German industrial boom, the machine tool show held last month in Hannover should set it to rest. Show officials counted more than 300,000 paid admissions to the exhibit by 638 German and 131 other-European companies.

They showed more than 15,000 tons of machine tools and accessories in nine big exhibit halls, and apparently closed a great many sales.

The 769 exhibitors included some 40 companies showing die-casting, welding, induction heating and testing machines. There were another dozen in spark erosion and ultrasonics. Unlike the exposition of the National Machine Tool Builders Assn. in Chicago, where floor sales are banned, Europeans depend heavily on selling at shows.

You don't have to dig very far to discover the basic reasons for the German boom. For one thing, depreciation laws are realistic — they practically penalize the company that fails to keep its tools modern. For another, labor kept the pressure off German industry until industry could get on its feet; even today labor seems to gear its demands to productivity increases.

Automatic program control was featured on a great many machines at Hannover. The most common method uses a punched card which is placed on the control panel; pegs are then pushed through holes in the card. Often, speed is controlled by the punched card, while feed is controlled by dogs.

Little Tape Control—Of some 500 machine builders showing, probably less than a dozen use tape control. Most Europeans will tell you that the added first cost, plus the need for skilled electrical maintenance people, precludes tape except in a few high-production industries.

The labor shortage—perhaps more than labor cost savings—has stimulated automatic transfer lines. There were 19 builders showing these lines at Hannover. The largest was a 22-station machine for automotive cylinder blocks.

Competition Is Rough—There were 23 press-brake builders exhibiting, and 85 builders of various types of lathes. But one major maker of transfer lines was not even showing; he was apparently too busy working off a 4-year backlog of orders from European automakers.

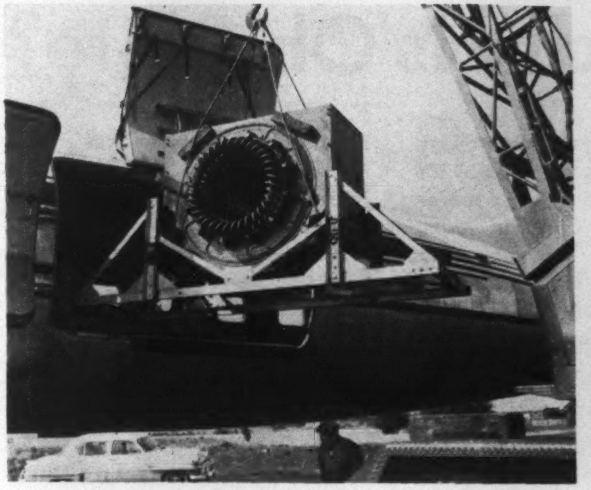
In fact, most European builders of the more sophisticated machines are up to their ears in work; deliveries of 5-spindle automatics are out to 18 to 24 months. And during the past few months, German builders have raised prices by as much as 12 pct.

Welding Gains — Resistance welders shown at Hannover resemble the U. S. product, feature electronic controls and a fair degree of automatic handling. These units are now being built into European production lines.

In spark erosion—where 11 companies exhibited — progress has not been rapid. But, as in the United States, it seems to be catching hold.

Finally, the German machine tool industry had little plant or machinery just 15 years ago. So what it is working with today is far newer than the U. S. average. Marshall Plan aid naturally helped a great deal in Europe's re-tooling—and particularly in Germany's.

GOOD SHOW: Some 300,000 visitors inspected more than 15,000 tons of machine tools and accessories shown by 769 exhibitors at the exhibition of German machine tool builders last month at Hannover.



FILL 'ER UP: Electrical equipment, destined for Europe, is loaded aboard a KLM Royal Dutch airliner.

READY TO GO: Seaboard & Western Airlines flew this load of construction machinery to Pakistan.

U. S. Ships by Global Air Freight

Machinery and machinery parts are particularly well suited to air transportation.

And more and more metalworkers are finding savings in shipping to world markets by air.—By T. M. Rohan.

▪ Shippers to overseas markets must allow 20 days to Europe, 30 days to the Orient. But air freight can slash delivery time to a day or two, often at a substantial saving.

This basically is why international air freight is growing at a rate even faster than domestic air freight. And last year it grew faster than foreign air passenger travel, too—16 pct to 14 pct. More and more U. S. and foreign companies are turning to air freight to save time and, frequently, money.

Flying Brains—Nine-ton electronic brains have been air freighted to Japan from Canada. Mining machinery is frequently shipped from the U. S. to Labrador. Oil well equipment is air-lifted from Texas to the Near East. Air conditioning equipment is moved from New York to the Persian Gulf.

Service is faster. Transhipment is eliminated. Pilferage is reduced. Packaging is lighter, less costly. And insurance, paperwork and customs fees are usually less.

Two-Way Traffic—The mainstream of U. S. traffic in international air freight is the North Atlantic route to and from Europe. Volume went up 45.5 pct last year to about 40,000 tons. Passenger traffic gained only 19.2 pct. This year commercial carriers expect to transport over 53,000 tons.

Moving Day — One of air freight's most pressing sales problems is to demonstrate total savings to traffic executives in order to justify the premium over water transportation.

For example, an $8 million electronic computer was shipped from New York to London. The high cost of export packing the 100 units almost made up the difference alone. Packing costs for water shipment were $680 and weight was raised from 1500 lb to 2100 lb. Total cost for water shipment was $937, by air it was only $839.

Cargo Capacity Grows—By next year there will be at least 60 all-cargo aircraft among the world's airlines. By the end of 1961, freight capacity of world airlines will be doubled over what it is now, predicts Sir William P. Hildred, director general of the International Air Transport Assn. World shipments last year totaled 1.19 billion ton-miles.

Because of relatively heavy weight, small bulk and high value, machinery and machine parts are frequently well suited to air shipment. Heavy machinery parts are being flown by Trans Canada Airlines to Seven Islands, Quebec, for the Iron Ore Co. of Canada's Labrador mines.

In 1959 the New York Port Authority serviced 200,000 tons of domestic and overseas air cargo combined, according to H. O. Fisher, head of the Aviation Development Div. "It is estimated that by 1965 cargo tonnage will reach 390,000 tons," he says. "By 1975 it is estimated that 680,000 tons of cargo will come through New York Part Authority airports."

How Much Capacity Is Obsolete?

High-cost, marginal mills are included in the steel industry's rated capacity.

Operating these mills doesn't appear practical, even in periods when steel demand is greatest.—By G. J. McManus.

- Are steel's standby facilities really standing by for future demand peaks?

The answer is no, based on recent developments. Judging by the last two demand peaks, 5 to 10 million tons of official steel capacity can be written off as far as commercial availability goes. Operating rates never went above 93 pct of capacity during the pre-strike boom in 1959 and never topped 96 pct in the shortage period after the strike.

Mill Thinking—While these percentages can't be taken as definite high water marks, there are signs the spread between real and theoretical capacity may be growing. New mill thinking on standby facilities is suggested by these moves:

National Steel Corp. is adding 2 million tons of new capacity at Great Lakes but is figuring on a net increase of only 500,000 tons. A large part of the addition will be offset by furnaces taken out of service.

Sharon Steel Corp. is providing no finishing facilities to go with 500,000 tons of high-cost capacity at Lowellville, O. Sharon says Lowellville furnaces will be used only in an extreme sellers market and then only for raw steel.

United States Steel Corp. has retired four openhearth shops in recent years.

Throughout the industry, management is taking a new look at high-cost facilities.

How Much Obsolete?—"It is obvious . . . that our industry has had and still has excess capacity," says Avery C. Adams, board chairman, Jones & Laughlin Steel Corp. "It is not quite so obvious that a large part of this excess capacity is represented by obsolete or standby facilities."

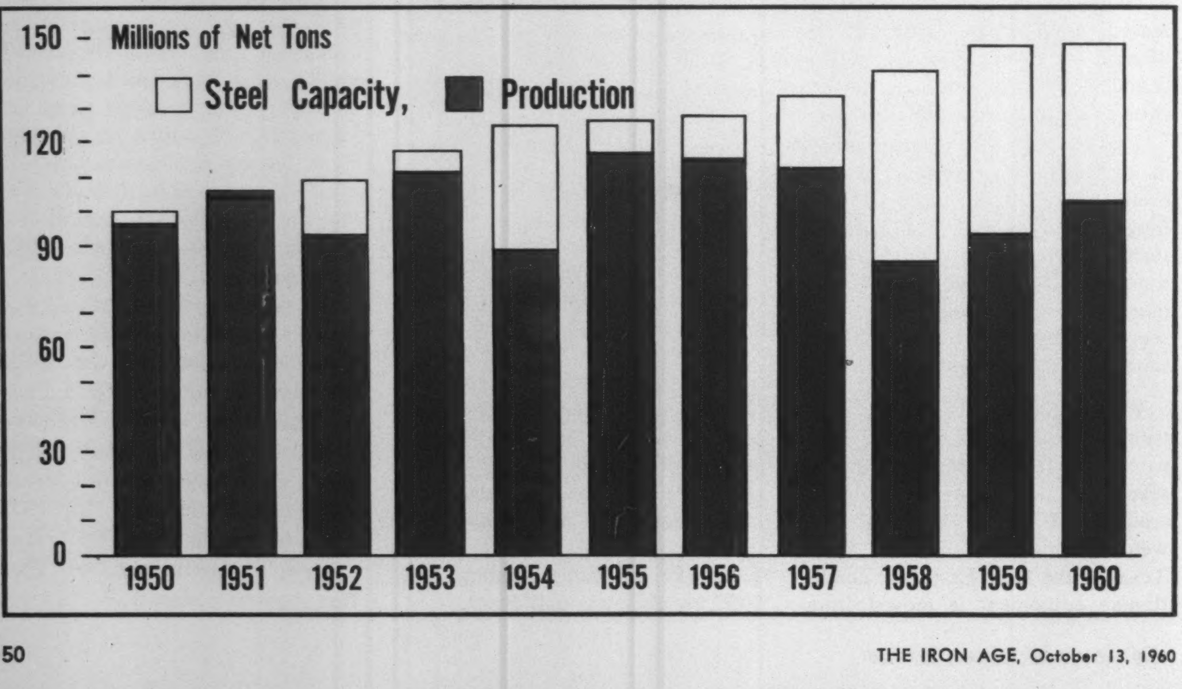
Mr. Adams goes on to say that "any rate above 75 pct can be considered as abnormal. . . ." Other steel men share this view. They feel the industry has moved past the postwar shortages and into a period of protracted normal demand.

Idle capacity is not just a measure of supply reserve; the quality of mill service varies with the amount of unused capacity. A change in mill thinking on facilities to be maintained could also change policies on rejections, deliveries and related matters.

Taking the long view, one economist says demand must either come up to capacity or capacity will come down to demand. There can never be a large gap between the two for very long.

Operating Patterns — With this outlook, the incentive to carry mar-

Capacity Only Tells Half of the Story



ginal capacity is small. The steel industry operated at better than 90 pct for 20 months in the 1955-57 boom. Operations went over 100 pct in 24 individual weeks.

In the 1959 surge, operation never reached 94 pct and averaged better than 90 pct in only three months. This year's buildup ran out of steam after about five months. For short, artificial spurts such as these, there may be a question on how much capacity mills want to maintain during long periods of normal demand.

Cost Disadvantages—Moreover, the payoff from marginal facilities figures to be smaller as well as briefer. New practices and processes have increased the cost disadvantage of obsolete equipment. Ten years ago one large mill was getting a maximum of 22 tons an hour from its largest openhearths and a maximum of about 13 tons an hour from its smaller units.

Today, the same mill is getting over 40 tons an hour from its big openhearths. Its small furnaces range up to 16 tons an hour. Openhearth men emphasize that output rates are not a direct measure of efficiency. Nevertheless, it is clear the mills are favoring their high-output shops in situations where they have a choice of producing points.

Oxygen's Role — Basic oxygen vessels offer even tougher competition for the high cost furnace. Vessels now operating can make steel at the rate of 100 tons an hour. New installations are expected to better 200 tons an hour. Where does this kind of production leave an openhearth that produces at 10 tons an hour?

Moreover, today's price levels afford little profit margin for the marginal mill. For the first time since the war, steel mills have absorbed a wage increase and gone two years without a price boost. Government and competitive pressures may force the mills to swallow another cost hike without price relief. Even before the current squeeze, older facilities were returning slim profits.

Market for One-Coat Enamel Sheet Grows

First introduced a year ago, one-coat enameling sheet is now catching on.

Appliance industry users are showing interest. Curtain wall applications are also promising.

—By K. W. Bennett.

▪ "We could cut our enameling costs by 25 pct with the new one-coat enameling sheet. I don't deny it." The speaker is steel buyer for a major U. S. appliance-making company. He admits the saving, but he isn't buying the new steel. What's wrong?

Bethlehem Steel Co., in October, 1959, announced Bethnamel, its one-coat enameling sheet. The firm pioneered in its development, is credited by appliance men with spearheading introduction of the new one-coat sheet to potential buyers. This January the price was announced—6.775 cents per base pound.

Armco Steel Corp. announced the same base price for its Univit in the same month. U. S. Steel announced Vitrenamel in July as available in commercial quantities.

Less Time, Lower Costs—A one-coat enameling steel means enameled parts must take one trip, not two, through the enameling line. Steel buyers freely admit this suggests a minimum enameling cost reduction of 25 pct. And the material sells at the base price of conventional enameling iron.

If the appliance industry is moving slowly on this windfall, it began to appear last week that the pace was quickening. At least one division of a major appliance producer will begin with November purchases, using 100 pct of one-coat enameling sheet.

Curtain Wall Use — Chicago Vitreous Corp. reports that a pickling line designed exclusively to pickle the new steel is in a consumer's plant, ready to roll. The firm expects three, possibly four, of the new high-speed pickle lines to be in action by early 1961. At least one of the lines will be in a curtain wall panel shop, marking one-coat enamel's entry into a fast-moving new field.

On the Move—Meantime, nobody's waiting. The steel industry is rolling ahead with new one-coat enamel sheet facilities. The annealing equipment, built by Lee Wilson Engineering Co., Inc., (see The IRON AGE, July 7, 1960) is already in action at two plants in addition to those already mentioned.

Study Wanted—Official attitude of the appliance industry on the new product: "We want to test it. Besides, the pickling equipment may require quite an outlay." But buyers say it's not a question of whether, but when, they'll make the switch.

A major roadblock to swifter appliance industry acceptance is fear that the new steel requires costly changes in present pickling equipment. Conventional lines will pickle enameling in 6-8 minutes, use a sulphuric acid bath, and remove about 4/10 gram per sq ft of metal treated.

Questions and Answers — They argue that the new steel requires a removal of 3-4 grams per sq ft, which would take one-half hour in a conventional bath. The answer to this one seems to have arrived already.

A ferric sulphate pickle line will do the job in the required 6-8 minutes. Modification of an existing line to handle the new steel can be done at as little as 10-15 pct of original line cost.

What Experts Say About Space Business

"For this partnership (government-industry) to work requires substantially more than the mere declaration by the government of its policy to have private enterprise participate in its space endeavors. Private enterprise must have a voice in whether it desires to participate and on what terms."—**Andrew G. Haley, American Rocket Society.**

"Such works (sale of engineering and R & D time) seldom provides a monetary profit, and practically never produces a proprietary product since the results belong to the customer. In fact, in certain cases, not only the work done directly under the particular contract, but any prior company concepts are claimed by the one who contracts for the services."—**Vice Adm. Seldon Spang- director of research, Garrett Corp.**

"Within government policy, the factors that determine which contractor arrangements will be used include need for speed, comparative costs, full utilization of the talents of private industry, location and caliber of technical know-how, and the need for sustaining reasonable government competence to supervise all R. & D."—**Lt. Gen. Arthur Trudeau, Army chief of R & D.**

Is Space Contracting Profitable?

Experts Say Industry Should Proceed With Caution

Space age contracts can be unprofitable for industry. But profits may be realized if caution is used.

Companies should search for high requirement items similar to their own product line.—By F. J. Starin.

▪ Recently Electric Storage Battery Co. was asked by McDonnell Aircraft Co., a prime contractor, to develop a battery for Project Mercury.

Electric Storage Battery looked the situation over, then said flatly: "No." Why?

Research and development would parallel the company's own research program. From a business standpoint, this is ideal. But under current government regulations, the battery company could lose all its proprietary rights on anything developed in relation to its Project Mercury subcontract.

Andrew G. Haley, general counsel for the American Rocket Society, offers this and other instances of government regulation keeping qualified industry out of space programs.

His comments were made at a recent American Management Assn. workshop on "How to Develop Profitable Business Opportunities in Space Age Technology."

Hard Cold Facts—Industry leaders heard many other cold facts of space contracting life—some discouraging; others encouraging.

Another speaker, Vice Adm. Selden B. Spangler, urges companies to consider the possibilities in space fields, but emphasizes caution. "It is almost a certainty that in production related solely to astronautics, at least for the foreseeable future, the maximum profits will go to materials manufacturers and to suppliers of chemical fuels and rocket engines."

Where to Look—Where does industry look for such opportunities? The current head of Army R&D, Lt. Gen. Arthur Trudeau, suggests the eight-volume R&D Problems Guide put out by the Army. More than a thousand areas are outlined in which the Army is seeking industry assistance.

Gen. Trudeau warns industry to watch two factors—long lead times and rising costs. It averages seven to eight years from discovery to production, he notes. This means that a weapon is hardly in use before it's obsolete.

On Cost, Gen. Trudeau points out that while the cost of living has risen 25 pct since 1949, it actually cost 400 pct more to develop the Sergeant missile than the Corporal.

Measure Value—Capt. Grayson Merrill USN (ret.), general manager of Fairchild Astrionics Div., Fairchild Engine and Airplane Corp., warns industry to carefully measure the value of a particular project before getting tied too closely to it. His yardsticks: military value, political value in terms of the idealogical cold war, commercial value and subjective value such as gaining scientific knowledge.

Some bright news on the scope of this market comes from Murray L. Weidenbaum, corporate economist for Boeing Airplane Co. He predicts spending of NASA will rise from $500 million this year to $2.2 billion by 1967. Then it will level off as existing programs phase out.

In the Race: Electric Heating

More Makers Enter Field as Utilities Lower Rates

The sale of electric heating equipment is at record levels, as utilities lower rates.

The big features are safety, less soot, lower installation charges and less maintenance. —By J. D. Baxter.

▪ The electric heating equipment industry refuses to believe that these are tough times. Last year, it probably had record sales. Probably only because no complete industry records were kept on residential electric heating prior to 1959.

However, last year, industry shipments of permanently attached electric heating equipment amounted to $27.8 million. These shipments were made by 58 manufacturers. At least another 13 are expected to enter the field during 1960-61.

Third Place—The annual volume of heat-producing equipment manufactured for habitable structures is now nearly $387 million. This includes electric heat, warm-air furnaces and steel and cast iron heating boilers. Of this total, approximately 46 pct use gas as a heat source; 42 pct use oil; 7 pct use electricity; and 5 pct use solid fuel.

Most utilities are unable to compete favorably with oil and gas prices. But surveys indicate many utilities sell competitively in areas where gas is priced at 55 cents to 75 cents per 1000 cu ft, and where No. 2 oil sells for 16 cents a gallon.

Industrial estimates say electric heating rates of about 1.5 cents per kwh are needed to compete across the board with oil and gas.

Sales Stress — Nevertheless, the electric heating equipment industry places selling stress on the "better way" rather than the "cheaper way." It sells flameless heat as the cleaner, safer, more luxurious heat. Also, electric heating is normally less expensive to install and maintain.

On top of all this, electrical heating requires no physical fuel supply. It provides even and easily regulated heat and it's compact.

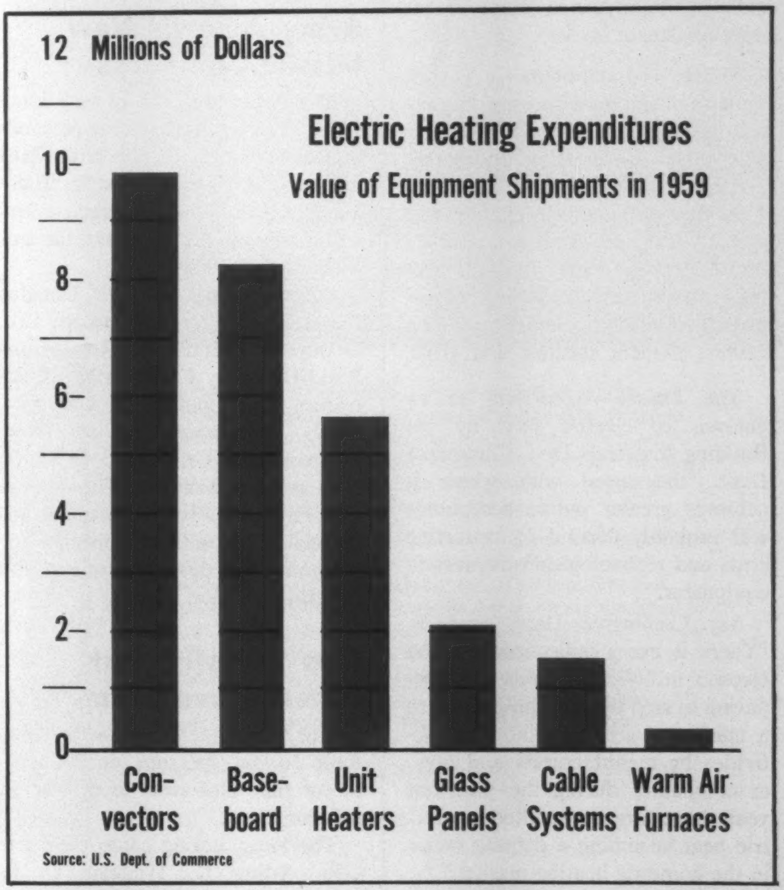
With this in mind, the industry is gearing to give chase to gas and oil. The National Electrical Manufacturers Assn. estimates that 850,000 of the nation's 50 million homes are now electrically heated. Just 10 years ago, only 100,000 homes were heated this way.

NEMA sees an industry goal of 6 million homes by 1970. The association's forecast, in terms of equipment and labor, calls for an annual market of $1 billion.

In All New Homes—C. F. Kreiser, general sales manager for Edwin L. Wiegand Co., predicts electrical heating will soon be built into all new homes.

The "big push" behind electric heating is the recent shifting consumption pattern of electric power. Traditionally, load peaks came in the winter. But wide-spread use of air conditioners has changed this

Convectors Run Ahead in Sales



Source: U.S. Dept. of Commerce

pattern. Now, according to the Edison Electric Institute, about 60 pct of U. S. electric utilities are at peak loads during the summer. In an effort to sell this unused winter capacity, special low heating rates are being offered in many cases.

Now that operating costs are more in line with other fuels, the rush is on in electrical heating.

Sales Targets—Sales are aimed at contractors, architects, home buyers, and owners. Recently, the marketing committee of the National Electrical Contractors Assn. announced a new course on contractor selling of electric heat.

While the big market for this method of heating is the new home, apartment houses are turning to electricity more and more. Individual room thermostat controls and the availability of additional rental area due to compact heating units, are selling points.

Also, lower installation costs and reduced maintenance make a hit with apartment owners.

Metals Requirements — A continued and increased swing to electric heating could have a considerable effect on heating equipment makers and metalwork suppliers. The most popular electric heating systems use no furnaces, storage tanks, pipes or ducts. Instead, electric heating uses steel casings (baseboard) and fittings, steel wall box covers, element sheaths, and grills.

The Future—According to an analysis of electric heat by the Building Materials Div., Commerce Dept., the speed with which it achieves greater public acceptance will probably depend on operating costs and technological advances in equipment.

Say Commerce Dept. analysts: "There is every indication that the electric utility companies are preparing to step up sales promotion to a marked degree. Promotional activities by manufacturers and power companies during the past few years have already resulted in electric heat becoming a definite factor in the domestic heating market."

Heating From the Bottom Up

HEAT FOR HEAT: A welder "tacks" longitudinal wires of length of wire fabric to 3 in. wide, ¼ in. thick copper bar. Part of a new heating system, the reinforcing wire fabric in a building's concrete floor slab serves also as an electric heating element.

Army Awards New Missile Contracts

The Army awarded an additional $199,125,000 contract for research and development on the Nike Zeus anti-missile system. Western Electric Co. is the prime contractor, and will continue the program for another six months.

Subcontractors include: Douglas Aircraft Co., Sperry Gyroscope Co., Goodyear Aircraft Co., Remington-Rand-Univac, Continental Electronics Co., Continental Can Co., Texas Instrument Co., and New Mexico State University.

In another contract, The Martin Co., Orlando, Fla., received an additional $10 million contract for research and development on the Pershing weapon system.

Can Industry Cut Defense Lead Time?

The nation's military leaders continue to put pressure on industry to cut time and costs in producing defense items.

The latest urging came from Lt. Gen. Arthur G. Trudeau, U. S. Army's Chief of Research and Development. The General says his office plans to cut the current "lead time" from conception of a new weapon until its delivery from seven years to four years. The Russians now do the same job in five years.

He says industry must help the Army whip the problem by more rapid and intensive exchanges of information at every stage of weapon development. Specifically, he urges more basic research by private industry and greater use of automation to achieve more accurate cost and time estimates in weapons production.

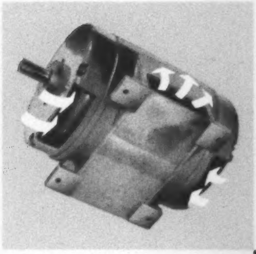
Railroads Want Higher Car Charge

Large Eastern industrial plants face a stiffer rental charge for use of railroad cars in plant operations.

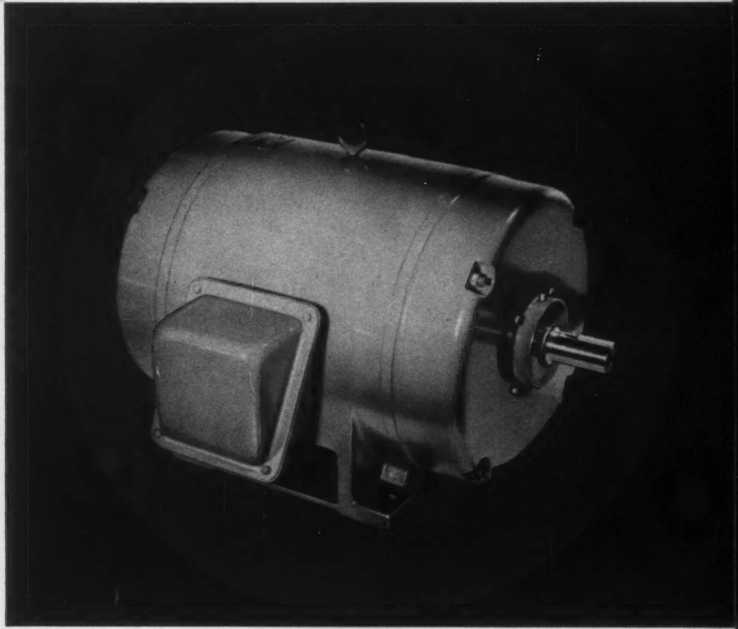
Eastern railroads are seeking a charge of $7.50 per day for each car used in plant service.

The proposed charge would apply when an industry used railroad cars for movements in connection with its own plant operations.

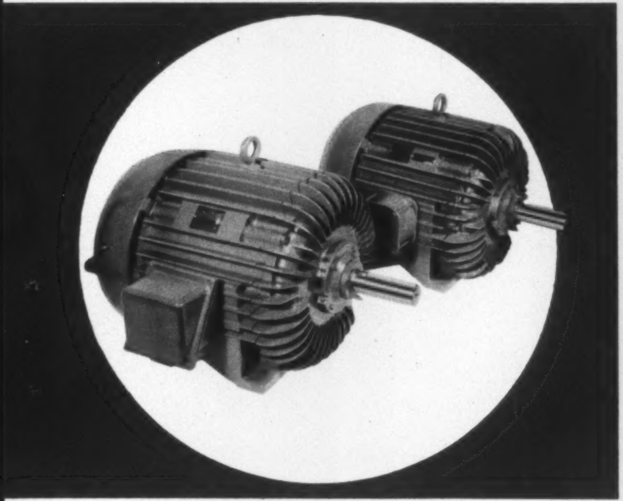
Ease the profit squeeze... cut expensive downtime with WAGNER® PROTECTED-TYPE MOTORS



Wagner DP Motors can't be affected by moisture, corrosive acids, salts, and alkalies. Air intakes and outlets are positioned to provide complete dripproof protection.



Wagner EP & JP Motors are completely protected against dust, abrasives, fumes, steel chips, or filings. Both ends of these motors have running shaft seals to keep the heavy-duty bearings clean.



Wagner® Protected-Type Motors do cut expensive downtime. Keep production rates up, too. For they operate with complete dependability... provide continuous service under the most severe conditions in their specific applications. To top it all, they pack plenty of power into precious little space, are lightweight and long-lived. Simply put... they get the job done.

Wagner Types DP, EP & JP Motors can bring you savings in initial costs, maintenance costs, and in continuity of operation. All three types are built with rugged, corrosion-resistant cast iron frames in NEMA size 182 through 445U. All are designed to meet a wide variety of applications. DP Motors, with their dripproof enclosures, can be used in many spots that once required splashproof motors. Totally-enclosed, fan-cooled EP and JP Motors (Type JP is also explosion-proof) are perfect power packages for automated lines. For complete information on these motors contact the Wagner branch nearest you, or write for Bulletins MU-223 and MU-224.

Wagner Electric Corporation
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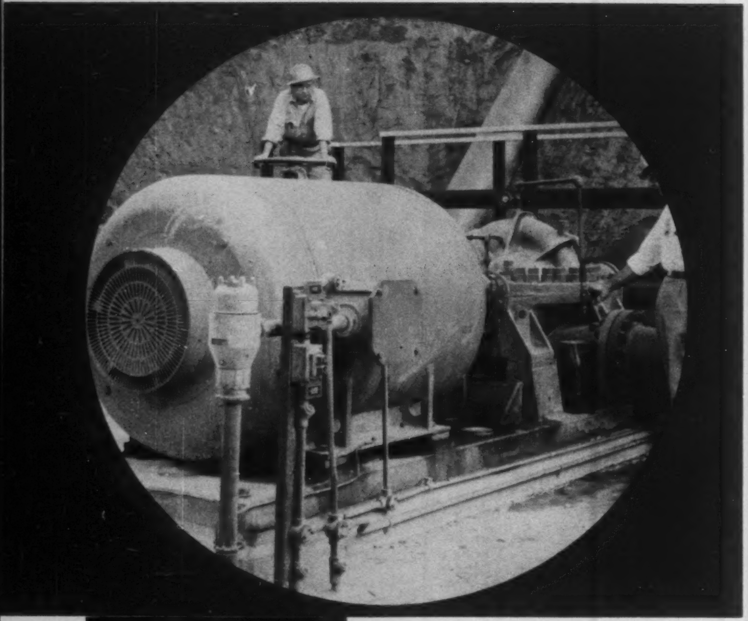
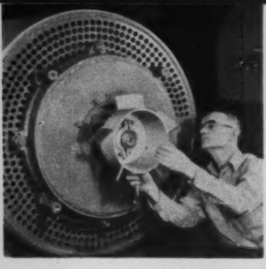
WM60-21

Take the "trouble" out of tough jobs...use
WAGNER® BIG JOB-RATED MOTORS





Wagner Types YP & ZP Motors have fabricated steel frames that contain a series of tubes through which cooling air is forced by an external blower. Internal blowers, one at each end of the rotor, circulate the warm air inside the motor through ducts in the rotor and stator and around cooling tubes.

Wagner Electric Corporation

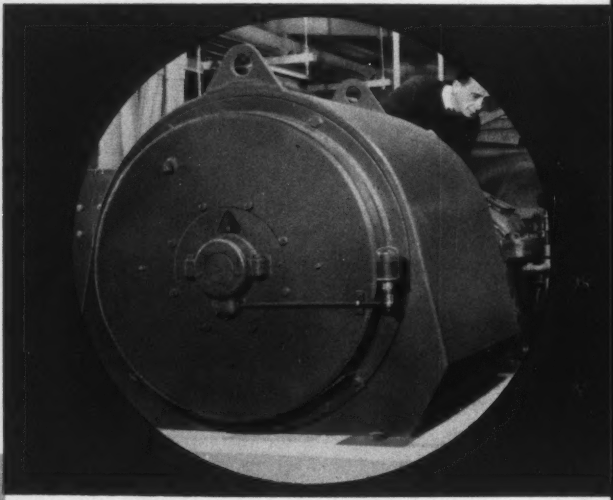
6400 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI

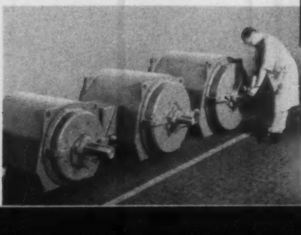
Wagner® Big Job-Rated Motors are all muscle. Power-packed, and with plenty of stamina, they're perfect drives for big pumps, fans, blowers, compressors . . . any heavy-duty application. When you need big motors that can operate for long periods of time without maintenance . . . that keep right on producing the power you need even under the most critical operating conditions . . . choose from Wagner Types RP, YP & ZP Motors. Put into service, they'll solve your large motor problems.

Built in ratings through 500 horsepower, totally-enclosed, fan-cooled YP and ZP Motors are tube ventilated for cooler running, long life. Type YP, standard TEFC, is available with Class A or Class B insulation; Type ZP, explosion-proof, with Class A insulation only. Type ZP can be supplied with Underwriters' Label for Class I, Group C or D, or for Class II, Group E, F, or G locations.

Compact, dripproof RP Motors can be used in many applications that used to require splashproof motors. Their newly designed enclosures resist external damage from corrosion or rough treatment, and prevent penetration of liquids. Windings stay dry, always. Available in ratings from 250 through 1,000 horsepower, Wagner RP Motors meet or exceed NEMA standards for polyphase squirrel-cage induction motors over 200 hp.

For complete information on economical, efficient Big Job-Rated Motors, contact the Wagner branch nearest you, or write for Bulletins MU-230 and MU-232.





Wagner Type RP Motors have electrical stamina that matches their mechanical ruggedness. They are available in frame sizes 504US through 962S.

Take an Executive Inventory

Today's emphasis on sound management puts more stress on finding and developing top executive talent.

Is there really a shortage in executives? Or has management neglected to develop the available candidates?

▪ Today's competition puts the emphasis on inventory control. But this may be the time to take another inventory—an inventory of your executive manpower.

Business trends in the next few years will increase the need for top-flight management men. Some of the reasons are these: Managers are becoming more specialized. Business organizations are growing more complex. In some industries, there's a trend toward decentralization. And there's a developing interest in new ideas about management.

Shortage or Not?—But the biggest single factor, of course, is the growth of business. Despite this, there's still no agreement on the question: Is there a management shortage?

One recent survey, conducted by Booz, Allen & Hamilton, Chicago-based management consultants, indicates executive demand will far outstrip supply by 1970. Upper executive manpower is already in critical demand, the report says. This group has increased 44 pct in the last ten years. Biggest gains in the number of key executives came in these industries: Fabricated metals, electrical machinery, transportation equipment, and paper manufacturing.

Back-Up Men Needed — One critical area, the study shows, is in the number of "back-up" executives. Most company presidents do not have enough of these younger replacements. In companies with a president 54 or younger, only 21 pct of the key executives are younger than the president. Even companies with presidents 55 to 60 have only about 55 pct of younger key executives. And, it is pointed out, "By 1970, 60 pct of all of today's presidents will be replaced, based only on projected retirements at age 65."

Who's at Fault?—But many top personnel officials in U. S. industry wonder if there really is an executive shortage. The Bureau of National Affairs polled its 1959-60 panel of personnel executives on the subject. Sixty-five pct denied there was a shortage of potential executives. Most blamed management itself for any troubles in filling executive jobs.

Some of the comments: "The hue and cry in the past about a shortage of competent executives really referred to a shortage of action in developing people. We have found a tendency on the part of many manufacturers to let other companies develop their executives for them."

Is This the Time to Retrench?

▪ One of the toughest problems for today's managers is created by the present business turndown.

Because of falling sales and the profit squeeze, capital spending is getting a careful review. But just because the business outlook is discouraging, it's not necessarily wise to cut back on capital improvements. There are sound reasons, in fact, why they should be encouraged.

Now Is the Time—The current adjustment provides a good time to make capital expenditures.

Logan T. Johnston, president of Armco Steel Corp., notes this in stating his company will go ahead with spending projects valued at $95 million. "We believe this is a favorable time for us to move ahead with this construction program," says Mr. Johnston. "We can make our dollars stretch further now than we could six months ago. Also (there will be) minimum interference with production schedules."

Other Reasons—There are other good reasons for spending now, instead of later. Your competition may not be retrenching. When the business correction is over, this could hurt you competitively. With buyers cost-conscious, there's a need for low-cost, improved production.

New products made on new equipment should have greater buyer appeal. Right now there's little or no waiting time for delivery of capital equipment goods. And finally, easier money makes this an attractive time for financing.

M&T Chromate Finish on zinc plate helps supplant costlier materials

Consider the needs of a familiar wire product . . . a refrigerator shelf. It needs to resist corrosion, must be strong, relatively inexpensive. Significantly, you'll find that many a top quality unit utilizes shelves made from ordinary steel which is zinc plated, chromate treated, and then topped off with a baked, clear enamel.

Such a finishing system, with Unichrome* Chromate Dip and Unichrome Clear Enamel, has been in use for almost 15 years. Good reason. It cuts costs, yet gives quality unmatched even by more costly materials.

You can do the same for your wire product or other zinc plated parts. Use Unichrome Dip in chromium-like clear or lustrous metallic red, green, blue or gold to dress up the zinc plate, "beef up" its corrosion resistance. The added eye appeal you see at a glance. The extra protection has tested out to be one of the highest among dyed chromate finishes.

All Unichrome Dips in the wide M&T line react chemically with the zinc surface, render it passive, prime it for organic finishes.

Typical cost of material for a Unichrome Dip Finish comes to just a fraction of a cent per square foot of surface treated. A new Unichrome Pick-a-Dip Chart gives details on finishes available. Write for your copy.

*M&T's registered trademark

M&T **plating products** · welding products
coatings · metals · chemicals
METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey

New Compacts Boost Aluminum

But Kaiser Survey Shows Rate of Increase Is Slowing

Engine blocks will increase aluminum use in the automotive industry.

Some cars will use more light metal, while others will use somewhat less than in 1960.—By A. E. Fleming.

▪ New aluminum engine blocks on some 1961 cars will boost the use of the light metal by auto makers in the next year. (For industry trends see p. 45). But if it weren't for the new blocks the boost would be small, nothing at all like the 10 to 15 pct a year gains aluminum suppliers have enjoyed during the past decade.

Kaiser Aluminum and Chemical Corp.'s annual survey of automotive aluminum use indicates automaking will require 14.2 lb more of the metal per car in 1961 than in 1960.

On the Other Hand—However an interesting fact is that six of the 22 models which were marketed in 1960 will use less aluminum in 1961 while one will use the same amount. Needing less poundage are Plymouth, Valiant, Dodge, De Soto, Imperial and Corvair while Pontiac will hold even.

Further, more of the cars that will use more aluminum in 1961 than 1960, most gains are under 5 lb, several are 1 lb or less. Thunderbird is the biggest gainer among the "old models" with over 15 lb.

Finished Weight — Kaiser estimates the net or finished weight of aluminum components will average about 62.1 lb per car compared to 54.4 lb on 1960 models. The estimate is based on production of over 6 million cars in 1961. Total net use by the industry is expected to total 379 million lb.

With the biggest increases brought on by the new aluminum engine blocks, the average net weight of aluminum functional parts will be 7.7 lb on the average car.

Small Cars Big Users—The new aluminum engine small cars will lead all models in aluminum use.

Leading aluminum using 1961 cars are: Oldsmobile's F-85 with 134.9 lb including a new V-8 engine block. Buick's Special with a similar V-8 which will use 132.6 lb of aluminum; the Rambler Classic Six which will use a die cast 6-cylinder aluminum engine.

(See next page)

Spectacular Auto Show Opens in Detroit This Week

SHOW PLACE: The 43rd National Automobile Show, Oct. 15-23, will be the dedication event for Detroit's new exhibition center which has the largest unobstructed indoor exhibit area in the world.

Here's the Long and Short of the 1961 Autos

Rambler American

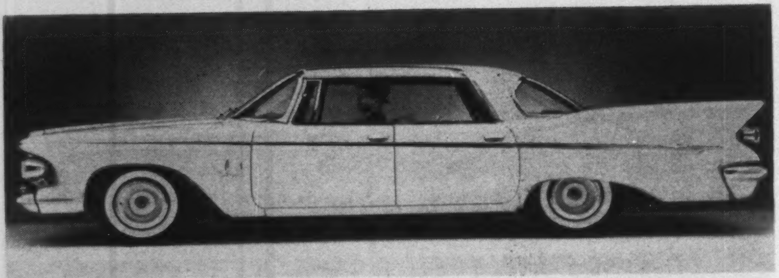
New Styling — Completely restyled for the first time since 1950, the cars are 5 in. shorter and 3 in. narrower than last year. Trunk space is up 50 pct. A convertible has been added.

Pontiac Tempest

Four-Cylinder—A lot of features set this car apart from other compacts. It has a four-cylinder engine in the front, but the transmission is in the rear. Overall length is 189.3 in. and the wheelbase is 112 in.

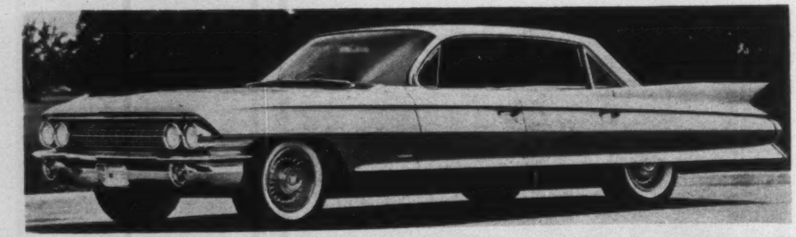
Imperial

Classic Appeal—Styling changes are few this year, but a return to free-standing headlights is a feature that should appeal to classic-car buffs. The grille is simple and clean in its design. Fins have been retained.



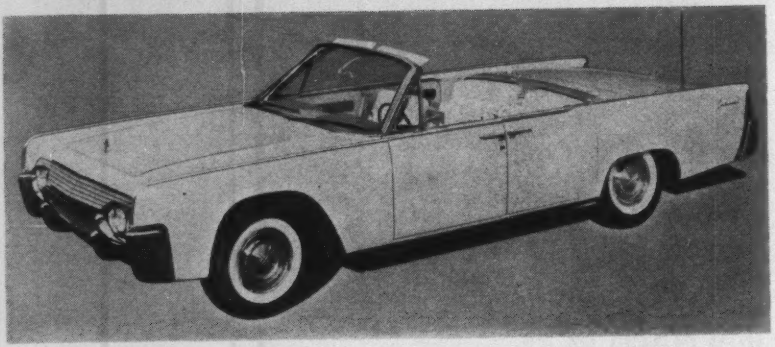
Cadillac

Greaseless—Engineering offers a big bonus this year: Grease jobs are a thing of the past. The car is "lubricated for life." New styling continues the policy of change through evolution.



Lincoln Continental

Two Models—Two lines are merged into one for this completely restyled car. Only two models will be offered: One is a four-door hardtop; the other is the first U. S. four-door convertible since 1941.



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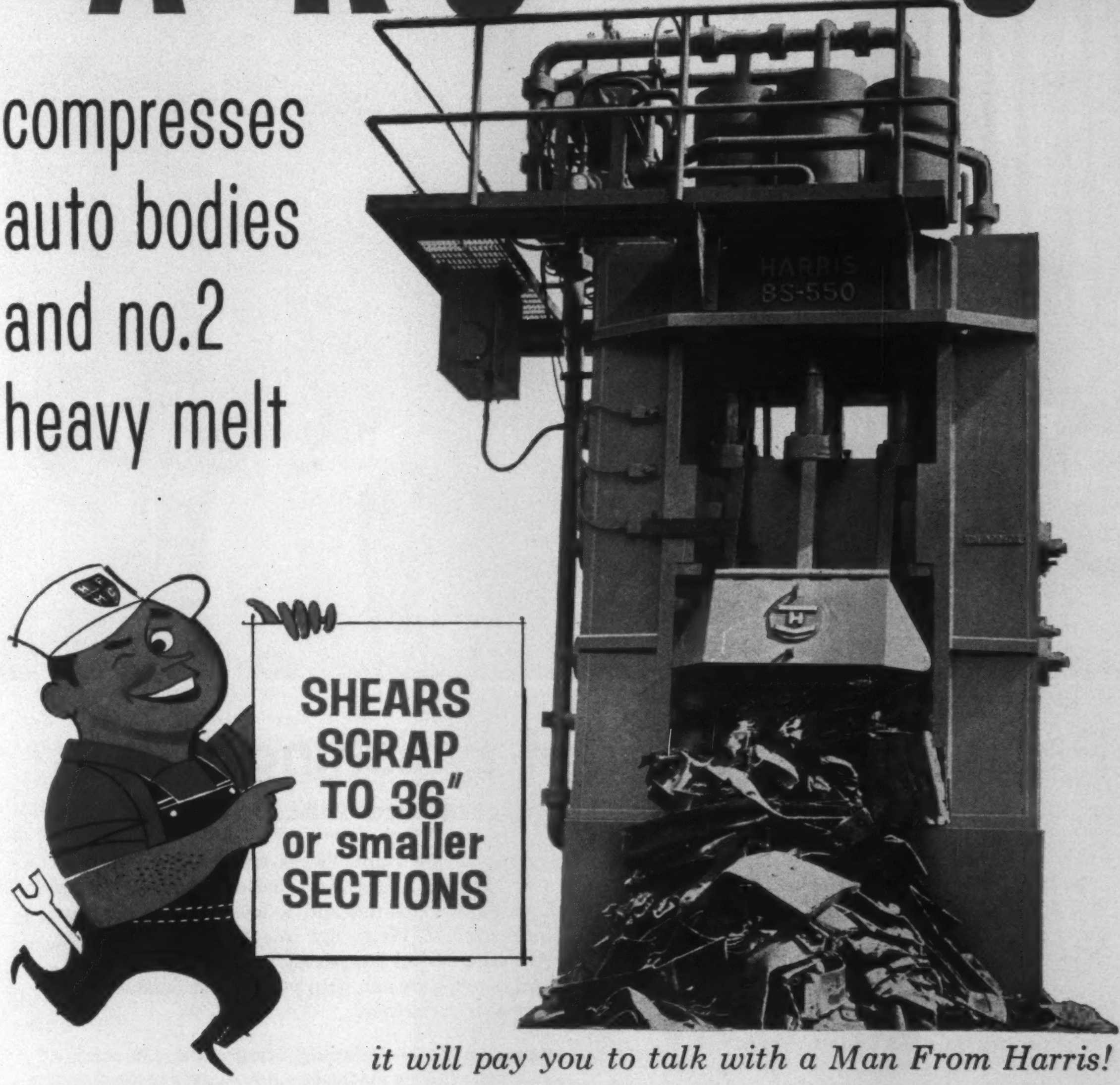

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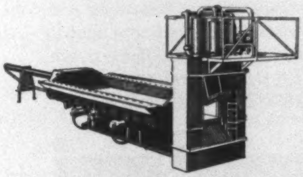

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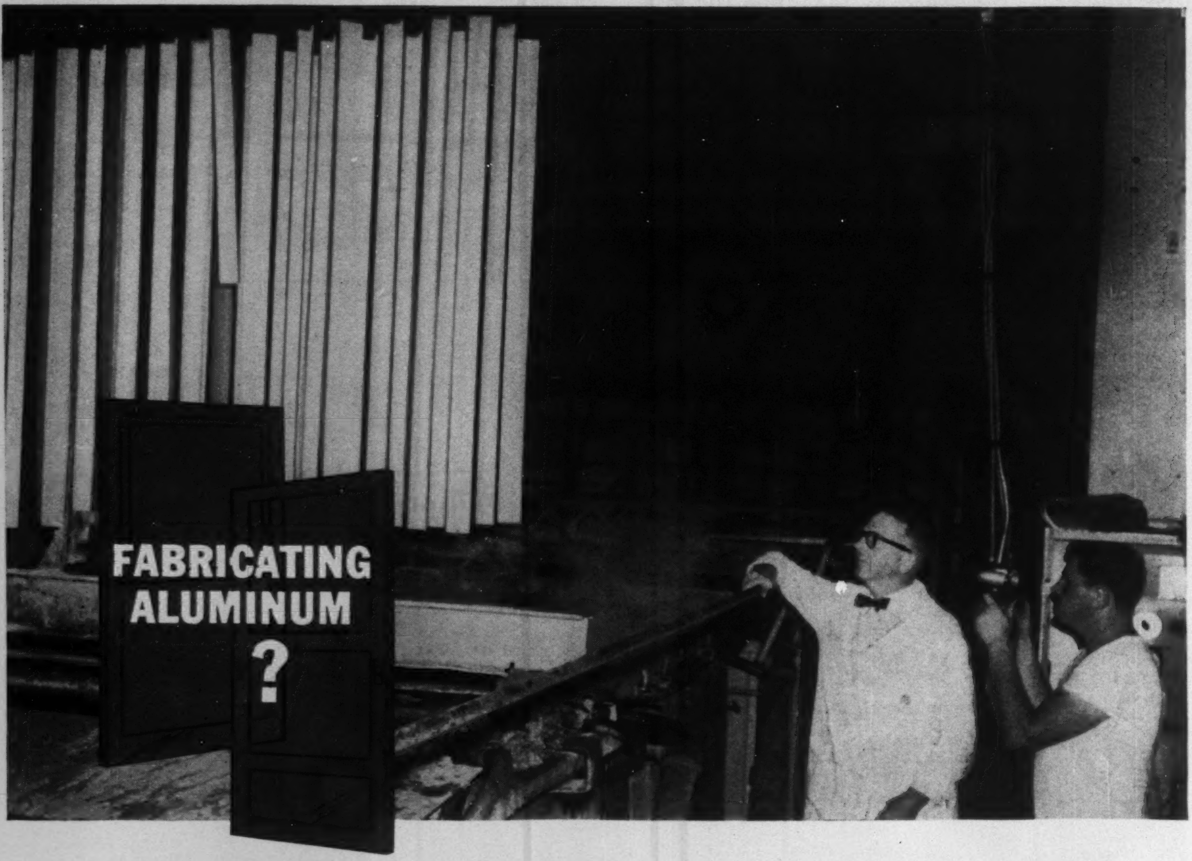

Pennsalt Cuts Metal Finishing Costs

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Does your investment in metal preparation chemicals—$40,000 a year or more in a typical aluminum fabricating plant—really work well with the half million dollars' worth of equipment that uses these chemicals?

Your metal finishing dollars will go further when machines and chemicals are working together . . . the way they do when you use Pennsalt's System Approach to metal surface preparation. Because Pennsalt supplies both the chemicals and equipment, we can treat your metal finishing line as an integrated system. It's the "work-together" way to make your investment pay off in peak production, top quality and low unit cost.

And Pennsalt's Metal Preparation Service Plan makes sure you keep getting top performance, too. Personalized service from a nationwide organization analyzes your metal preparation needs, recommends the right "work-together" equipment and chemicals, aids installation and startup of automatic machines and follows up with regular service calls. Write for free Booklet 345, "The Pennsalt Metal Preparation Service Plan" . . . and see how we can help your metal finishing dollars stretch further.

Pennsalt Metal Finishing Equipment • Washers • Automatic coating machines • Automatic phosphatizing machines • Automatic pickling machines • Drying and finish bake ovens • Paint spray booths • Complete finishing systems

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Farwest Economy Has Dark Side

However, Quarterly Poll Shows Continued Expansion

A recent poll of Farwest businessmen reveals that all is not well.

Steel and construction are the sore spots. But overall business activity is expected to continue good through the fourth quarter.—By R. R. Kay.

▪ There are some rough spots in the Farwest's economy. And there's a lot of gloom talk going on among businessmen.

What really is the picture? A Prudential Insurance Co. of America poll throws some light. Every three months the company polls 1000 Farwestern businessmen. It asks: How do you think your business will go in the next quarter?

Here's the summary: Business activity in the West will continue to expand during the final quarter of 1960. About 51 pct of those polled say that the dollar volume of their business in the fourth quarter will top the third quarter. About 14 pct look for business to equal the third quarter, while 35 pct expect a decline.

Nevertheless, the show of optimism is at the lowest point since the spring of 1958.

Limping Along—Rough spots in the Farwest's economy stand out like a sore thumb. The steel industry is limping along at a little better than 50 pct of capacity. Last week, one major mill operated at only 38 pct.

Also, the construction industry has known better days. The Prudential poll sees a pickup there. Some 57 pct expect to equal or better last year's fourth quarter.

But as you look at the overall situation, Farwest industry is on an even keel.

Drydock Missiles?

Drydocks for launching pads? The Navy is looking into the possibility.

Rear Adm. Charles B. Martell, assistant chief of Naval Operations Development Branch, says the Navy is eyeing large drydocks, now in mothballs, as mobile launch pads for big space vehicles. He says that using a drydock would allow heavier payloads to be orbited.

"A drydock could be towed to positions that would allow for a straighter shot into orbit.

Aerospace Is Up

Things are looking up for the Coast's aerospace industry — the region's No. 1 employer of factory help.

Missilemaking is on the increase. Several companies expect good-sized aircraft orders from the Pentagon. All in all, there seems to be a better feeling among the major manufacturers and their subcontractors.

Not Bullet Proof, But Fool Proof

STILL EFFICIENT: A moving belt radiator for space vehicles is being punctured by a high-powered .22 calibre rifle bullet. The radiator, developed by Rocketdyne, a division of North American Aviation, Inc., is designed to operate efficiently even though punctured by meteoroids.

Marvel
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He's Watching a Band Sawing Miracle

This band saw operator at the Bell & Gossett Company plant in Morton Grove, Illinois, is watching "Controlled Accuracy" . . . accuracy, being held to within a few thousandths of being perfectly straight, and he can actually *see* the band blade being guided in the saw cut to produce this accuracy! No further machining is required before the pipe is welded into an assembly for a Bell & Gossett Heat Exchanger Unit.

Band sawing accuracy like this is nothing short of miraculous—especially when it can be done on a high production basis, as Bell & Gossett is doing. And when the same tolerances can be held on cut-off pieces from 2" to 18" in diameter, this MARVEL #81 Band Saw Machine can be truly called a precision machine tool.

The secret of this amazing sawing accuracy is in the MARVEL "SURE-LINE" Automatic Accuracy Control—a simple and extremely effective electro-mechanical servo-mechanism that continuously senses and automatically corrects any tendency of a band blade to drift to either side of a desired line of cut. The "SURE-LINE" unit literally "steers" the blade to make a straight cut. This permits the use of heavier feed pressures and, when desirable, higher blade speeds, to do the work faster, without sacrifice of accuracy. Incorporated in the new MARVEL #81 Series High Speed Heavy Duty Hydraulic Band Saws, the "SURE-LINE" permits full utilization of all the advantages of high speed steel band saw blades—while extending their usable blade life as much as 50%.

Before you buy any band saw machine, get complete details on MARVEL #81 Series Single Cut, or Automatic Shuttle Type Bar Feed Production Band Saws—the machines DESIGNED AND BUILT TO REDUCE SAWING COSTS. *Write for catalog today.*

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Unified Study: Key to Progress?

Advances in Machining Technology May Depend on It

A researcher says there is a continuing need for a unified research program.

It should employ all of the physical sciences and engineering.—By R. H. Eshelman.

DRILL RESEARCH: Tool geometry has been explored at Cincinnati Milling Machine Co. to see if something can be done to improve drill points. The result is better drill life and performance.

▪ Engineers, planners, and technical management more and more are facing new challenges in metalworking. The space race, advancing military technology, miniaturization, new metals and alloys, new demands for product reliability are all part of this rapidly changing picture.

Even relatively stable products are feeling the impact of fast technological advance. Big question for the machinery field is whether present research efforts can keep pace.

Director of physical research at Cincinnati Milling Machine Co., Dr. Eugene Merchant, foresees a continuing need for a unified research program in machining technology. It should utilize both basic and applied research; employ all of the physical sciences and engineering. He sees many areas where this type of approach would be useful in coping with the production problems of the future, large and small.

Areas of Search — The search may range from laboratory ideas to present equipment and methods including hot machining, use of radioisotopes, basic metal cutting theory, the milling cutter edge and shape, tool geometry. And further, there's exploration ahead for unconventional processes of metal removal. For example, electro-chemical machining appears to be still in its early stages of development. More can be expected.

Even further ahead are many other principles and techniques he believes the industry should have under scrutiny for development into precision machining processes for the future.

Tomorrow's Processes? — He cited some in a recent speech before a production engineering research group in Great Britain: The phenomena of the concentrated energy of the plasma jet, the erosive action of high velocity jets of fluid, or the destructive action of focused shock waves. Some of these could prove seedlings to develop into tomorrow's new processes.

Only time and a well-organized, unified metal removal research program will tell whether these or other as yet unexplored techniques hold the key to future advances in machining, Dr. Merchant believes.

New Points—And there is positive evidence to cite for the advantages of the approach outlined. Specifically, one program, in studying tool geometry, revealed that something could be done to improve the geometry of the common drill. So a scientific investigation was begun on the conventional cutting point—which has been taken for granted for so many years.

INDUSTRIAL BRIEFS

McLouth Grows—McLouth Steel Corp., Detroit, has increased its annual steel ingot capacity to 2.5 million net tons. The new capacity was increased from 2.4 million net tons. This accomplishment was due to the completion of McLouth's recent expansion program.

Controls Center—On September 29, Robertshaw - Fulton Controls Co. opened its new Eastern Research Center at King of Prussia, Pa. The center is devoted to research and development of industrial and military control devices and applications. The building was completed in 1959 at a cost of about $600,000.

New Frontiers — The Producto Machine Co., Bridgeport, Conn., formed a new division for the design, development and manufacture of plastics machinery. Known as the Plastics Machinery Div., it will introduce its line of blow-molding and sheet-forming machines and accessory equipment in November.

Cash Awards—A $25,000 award program for Progress In Arc Welded Design is being sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland. The program offers cash awards for papers describing the welded steel design of either machines or structures. Information may be obtained from the Foundation, P. O. Box 3035, Cleveland. Competition closes July 17, 1961.

Starts Motor Production—Wagner Electric Corp., St. Louis, has started production of standard fractional horsepower motors at its new manufacturing plant at Brinkley, Ark. The 90,000 sq ft building was designed for a continuous-flow layout of machines, assembly lines and testing equipment.

Award Presentations—The American Society for Metals will present awards to seven leaders in the field of metalworking on October 18 and 20. Receiving awards at the annual ASM Awards Luncheon at the Philadelphia Trade and Convention Center, Oct. 18, will be: Dr. Bruce Chalmers, Harvard Univ. professor, the Albert Sauveur Achievement Award; and Dr. J. B. Clark, research engineer, Dow Chemical Co., Midland, Mich., and Dr. F. N. Rhines, head, Metallurgical Research Laboratory and research professor of metallurgy, Univ. of Florida, the Henry Marion Howe Medal.

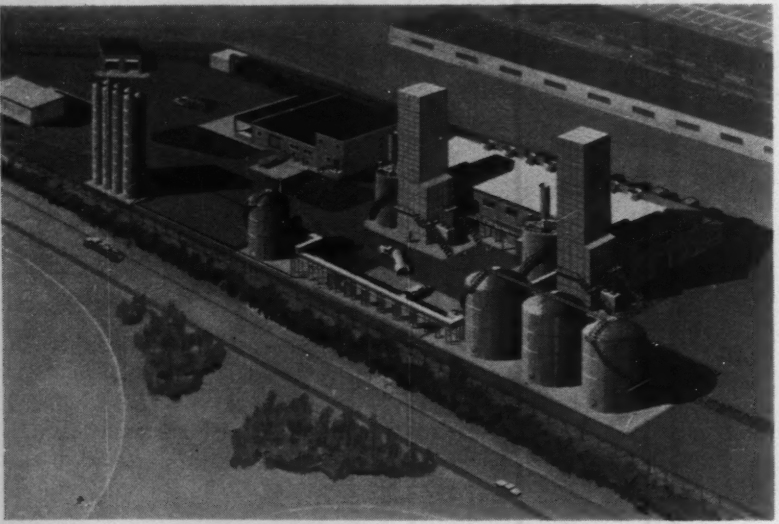
At the ASM annual dinner in Philadelphia's Bellevue - Stratford Hotel, Oct. 20, awards will go to: J. B. Johnson, a Dayton, O., engineer, the 14th Gold Medal of ASM; H. B. Knowlton, retired International Harvester Co. engineer, the first William Hunt Eisenman Award; Dr. C. H. Mathewson, professor emeritus of metallurgy and metallorgraphy at Yale Univ., the first Albert Easton White Award; and Dr. E. W. Engstrom, senior executive vice president, Radio Corp. of America, the ASM Medal for Advancement of Research.

A New Division—J. H. Williams & Co., Buffalo, N. Y., Div. of United-Greenfield Corp. has formed a new automotive division to be known as Vulcan Tool Co. The new division will market a line of automotive repair and service tools and related equipment, under the brand name "VULCAN." It will occupy quarters apart from the Williams' plant and be staffed with its own management, sales and operating personnel.

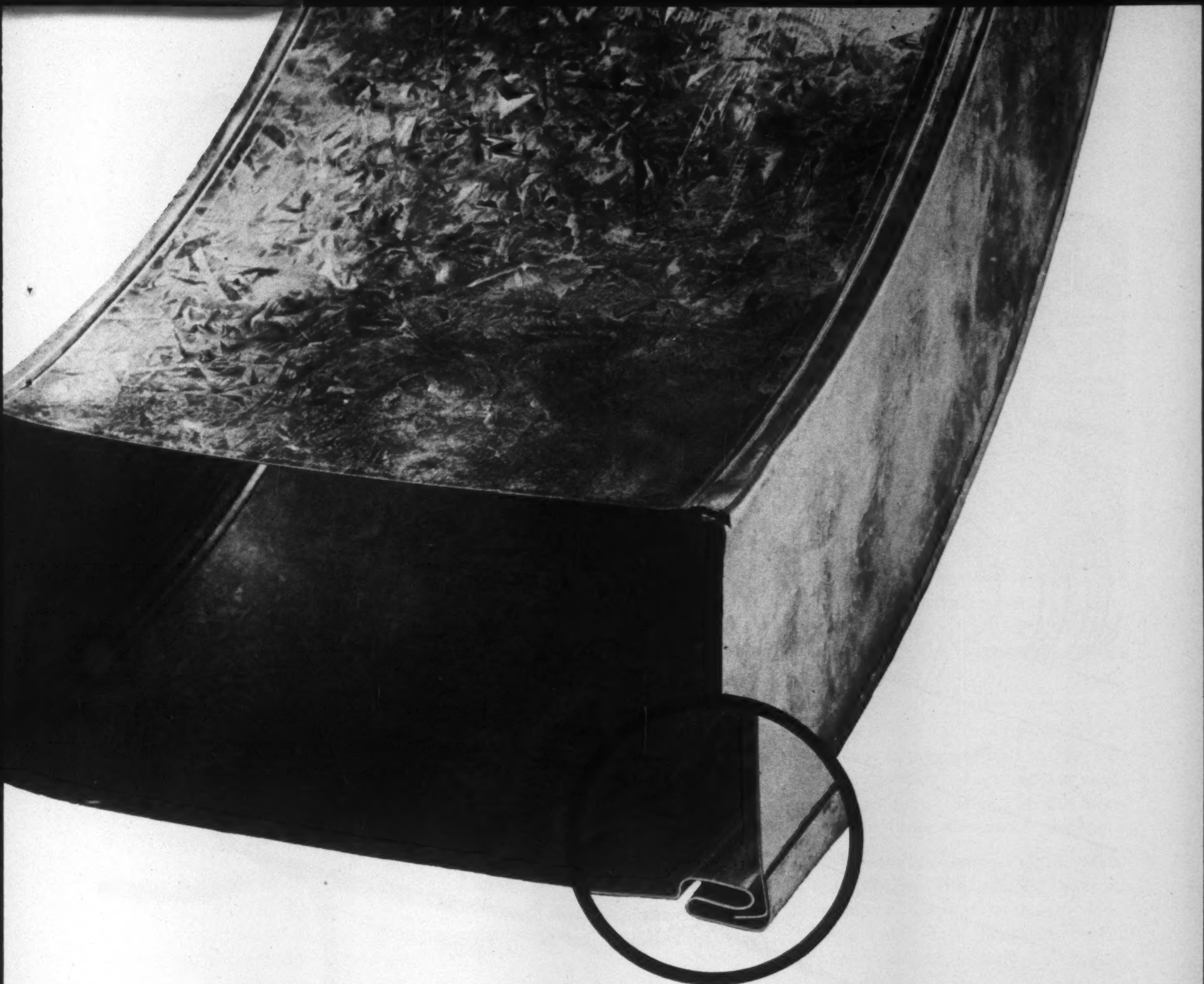
Reynolds Expands—A $600,000 expansion of Reynolds Metals Co.'s aluminum reduction plant will take place at Longview, Wash. It will make possible production of extrusion ingot, other improved ingot products and bar stock for making aluminum conductor wire. The expansion is scheduled for completion in about six months.

New Name — TRW Computers Co. is the new name for The Thompson-Ramo-Wooldridge Products Co. The company will continue to function as a computer division of Thompson Ramo Wooldridge Inc. Headquarters will remain in Beverly Hills, Calif.

More Oxygen in the Works



INDUSTRIAL BREATH: This $10 million oxygen plant is being built in Cleveland by Air Products, Inc. When completed in early 1961, the new plant will supply 500 tons of pure oxygen per day to Jones & Laughlin's Cleveland Works and 70 tons per day of liquid oxygen to nearby industries.



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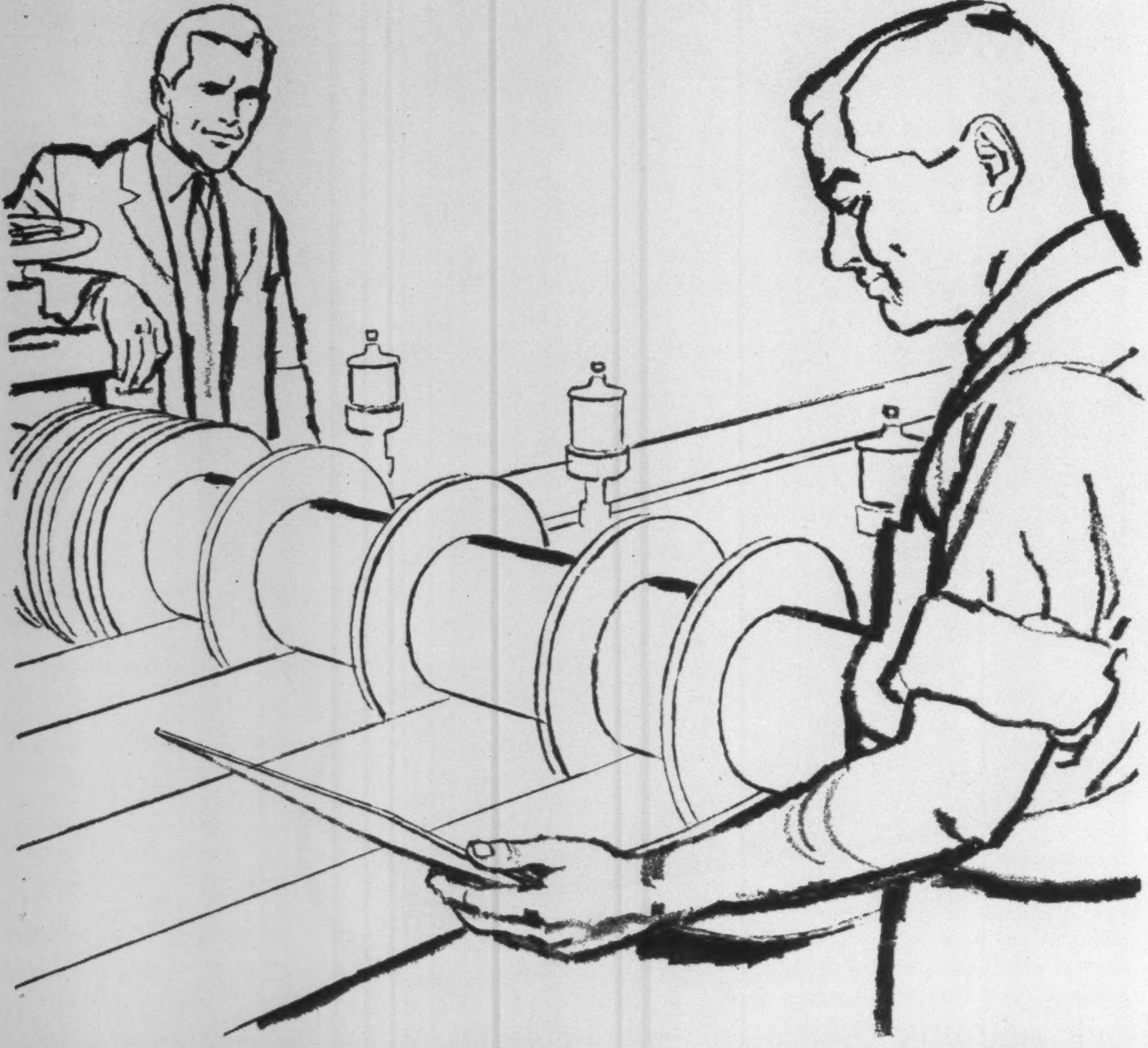
Weirkote will also be available in 1961 from National's Midwest Steel Division, Portage, Indiana.



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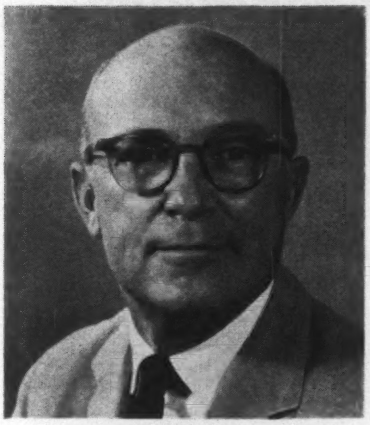

L. D. Simonson, appointed general manager, sales, United States Steel Products Div., U. S. Steel Corp.

Cogsdill Tool Products—**G. A. White,** elected president, succeeding **F. A. Cogsdill,** who has been named vice chairman of the board; **B. N. Brown,** elected treasurer.

Sheldon Machine Co., Inc. — **H. B. Carroll, Jr.,** elected president and general manager.

Westinghouse Electric Corp. — **P. N. Ross,** elected a vice president.

Kaiser Engineers International— **J. E. Boyce,** elected a vice president.

J. I. Case Co., Marketing Div.— **A. E. Lee,** appointed vice president.

Rolled Steel Corp.—**H. O. Spier,** named vice president, export operations.

Clearing Div., U. S. Industries Inc.—**E. K. Johansen,** vice president, engineering.

Koppers Co., Inc.—**J. D. Rice,** appointed vice president.

Robin Products Co. — **J. W. Stoutenberg,** appointed to vice president, sales.

Westates Steel Corp.—**J. L. Murphy,** appointed vice president, director and general manager.

E. W. Bliss Co.—**J. A. Bray,** appointed manager, trade relations.

Baldwin - Lima - Hamilton Corp., Industrial Equipment Div. — **Leon Mollick,** appointed manager, engineering, Philadelphia.

Wellman Engineering Co., Anker-Holth Div.—**W. F. Wilson,** named general manager, Port Huron, Mich.

United States Steel Products Div., U. S. Steel Corp.—**D. O. Merrill,** appointed district manager, sales, Canada.

Martin Steel Corp.—**E. L. Sadowski,** appointed asst. works manager.

The S. K. Wellman Co.—**P. H. Henning,** appointed industrial relations director.

W. G. Bancroft, appointed manager, Grinding Wheel Plant, Products Div., The Cincinnati Milling Machine Co.

Overly Manufacturing Co.—**E. C. Ellison,** appointed asst. to the vice president, production and engineering, Production Dept.; **Millan Shevchik,** becomes director, operations.

Associated Spring Corp., Seaboard Pacific Div.—**E. C. Spal, Sr.,** appointed general manager, Gardena, Calif.; **T. L. Sorensen,** named sales manager, Gibson Div., Mattoon, Ill.

The Goodyear Tire & Rubber

(Continued on P. 72)

A. P. Taber, elected vice president — research and development, The Babcock & Wilcox Co.

W. E. Anderson, appointed vice president and general sales manager, Cosa Corp.

R. W. Tuthill, appointed manager, engineering, Special Products Dept., Air Reduction Sales Co.

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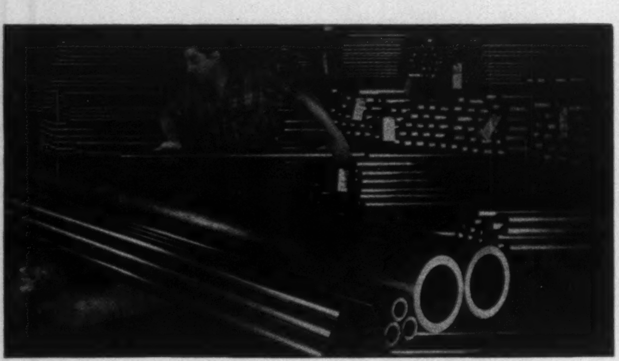
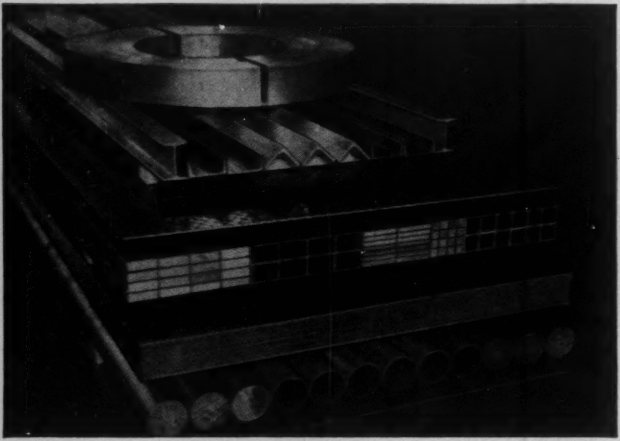
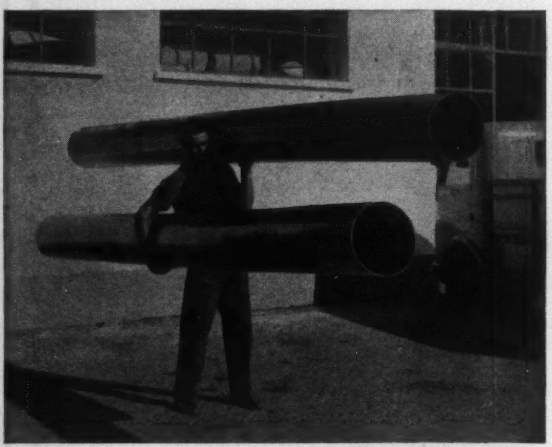


TUBING AND COLD FINISHED BARS—Here again, Ryerson stocks are by far the nation's largest—including seamless and welded mechanical tubing; hydraulic cylinder and fluid line tubing; structural tubing; new Ledloy® 170 tubing, etc. And in cold finished bars—shafting, machinery steel, accuracy stock and screw stock, including fast-machining Ledloy 375 & 300.



ALUMINUM—Nation-wide Ryerson service on Reynolds aluminum includes all mill products—a full range of alloys, tempers, gauges and sizes. Stocks include: flat and coiled sheet; plate; tubing and pipe; wire, rod and bar; structural and extruded shapes; commercial building products and related items.



INDUSTRIAL PLASTICS—Call Ryerson for Ryertex-Omicron PVC pipe and tubing, sheet and rod: plastic that conquers more than 281 corrosive liquids and gases—will not weather, rot or age. Also for rigid Kralastic and flexible polyethylene pipe, and Ryertex® laminated phenolic resin plastics in sheets, rods and tubes . . . special shapes molded to your specs.

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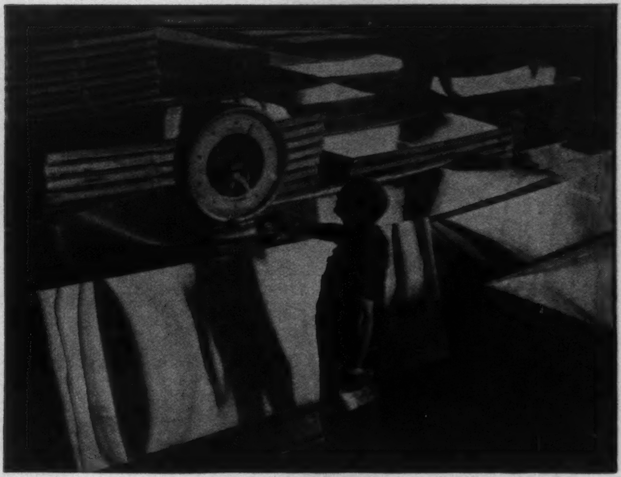
ALLOY STEEL—Ryerson developed and perfected a plan to assure risk-proof alloys through an 8-Step Certified Quality Program—and leads the industry in size and diversification of stocks, including case-hardening, direct-hardening and heat-treated alloys; leaded alloys, including Rycut® steels (fastest-machining in their carbon ranges); aircraft quality alloys, etc.



STAINLESS STEEL—2351 sizes, shapes, types and finishes of stainless in Ryerson stocks. All certified to meet ASTM, SAE, Military, DuPont or G.E. specifications—assuring close control over chemical composition and mechanical properties. Call us for all your requirements on stainless sheets, plates, bars, pipe and fittings and tubing, heads and machine-cut rings and discs. Cutting facilities include latest Heliarc equipment.

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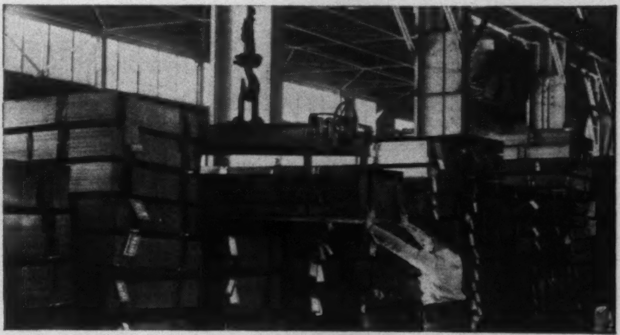

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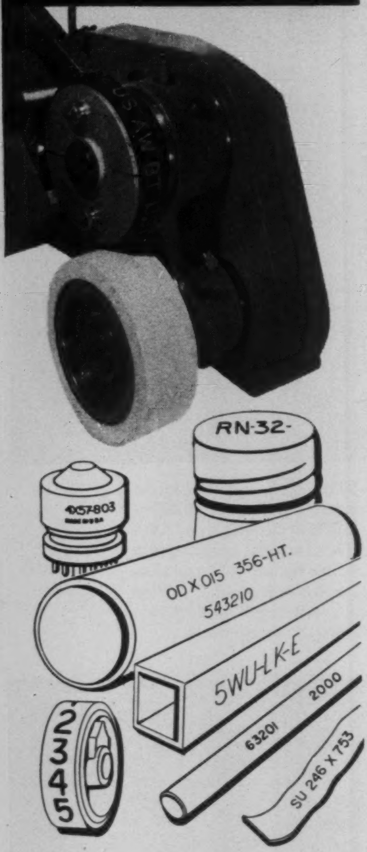

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(Continued from P. 69)

Co., Metal Products Div.—**R. J. Burns,** appointed general manager.

General Logistics Div., Aeroquip Corp.—**R. D. Hitt,** appointed eastern sales manager.

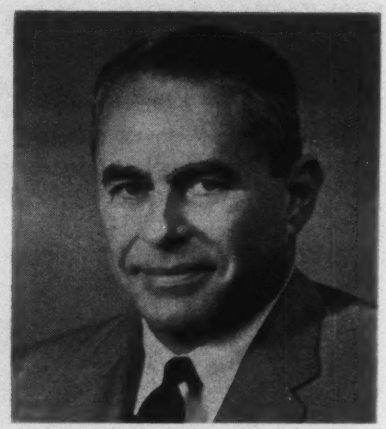
F. T. L. Grimm, named director, purchases, Ex-Cell-O Corp.

The Brush Beryllium Co.—**P. A. Zampino,** named division manager, metallurgical services, Pennrold Div., Shoemakersville, Pa.; **K. W. Miller,** appointed asst. manager, ceramic sales, Sales Div. in Cleveland.

ACF Industries, Inc., Electronics Div.—**C. P. Harbaugh,** appointed product line manager, machine tool sales.

Hyatt Bearings Div., General Motors Corp.—**E. P. O'Neill,** appointed asst. general sales manager.

W. J. Vonah, appointed general manager, sales, Erie Forge & Steel Corp., Erie, Pa.



W. M. Adler, named manager, sales, National Alloy Div., Blaw-Knox Co., Pittsburgh.

Wheeling Steel Corp. — **L. F. Jagucki,** named superintendent, continuous buttweld furnaces, primary finishing and galvanizing, Benwood Works; **R. P. Long,** appointed superintendent, services.

Ingersoll-Rand Co.—**R. J. Bunch,** appointed manager, Centrifugal Pump Div.; **G. T. Jones,** named manager, Condenser Dept., and **T. E. Bennett,** appointed manager, Engineering Pump Dept.

H. K. Brill, named general sales manager, Atomic and Process Equipment Div., A. O. Smith Corp.

Climax Molybdenum Co., Div. of American Metal Climax, Inc.—**R. W. Gilbert,** appointed Eastern district manager, refractory metals development.

Minneapolis - Honeywell Regula-

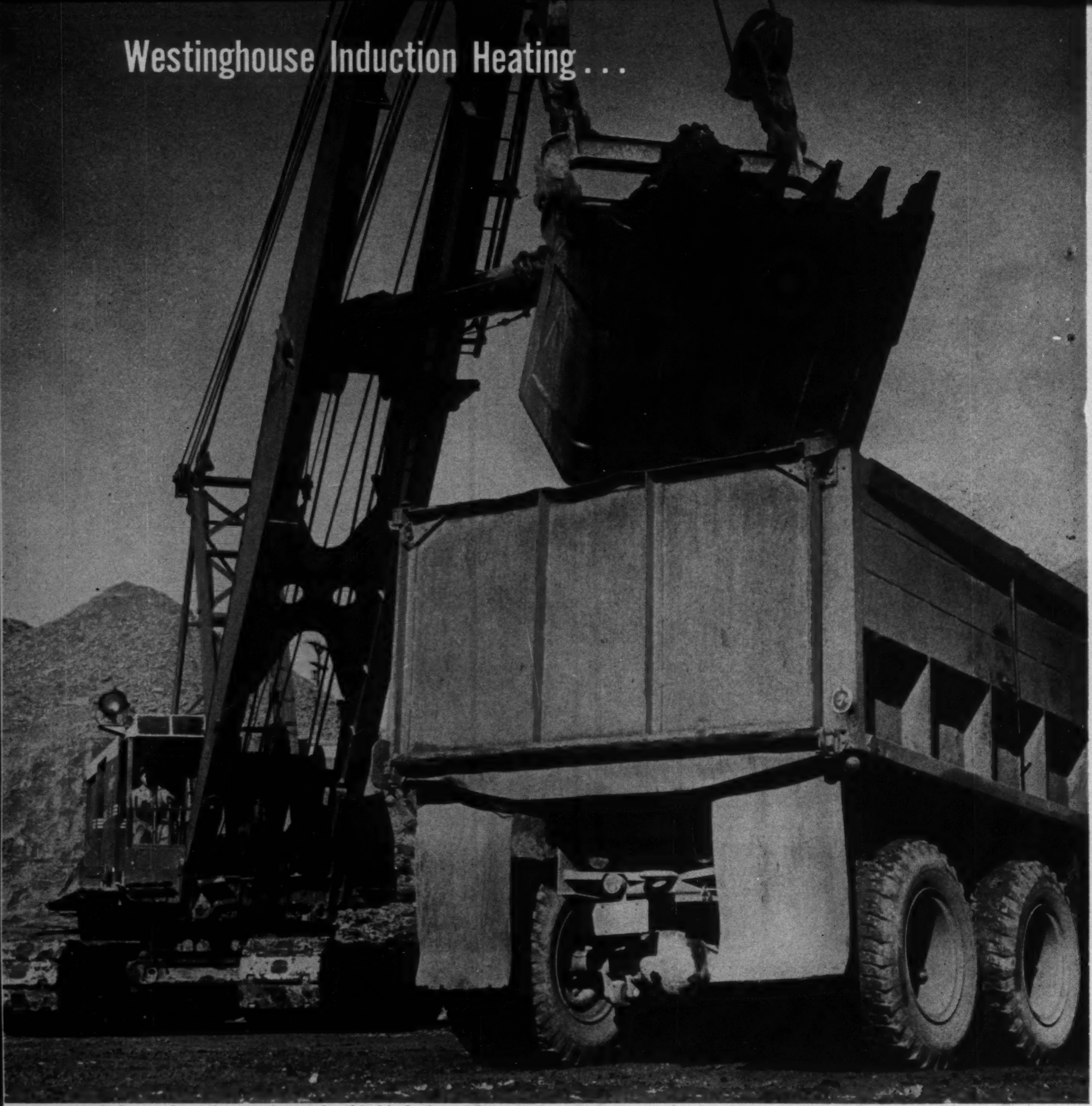
(Continued on P. 75)

1,000 Feet of NORMALIZING LINE at Inland Steel

This is another major unit in the continuing expansion program of Inland Steel Company of Chicago. The line normalizes cold rolled mild steel strip, 16 to 24 ga., 24 to 60″ wide, at furnace speed of 50 to 125 f. p. m. 60,000 lb. coils are fed into the line and 40,000 lb. coils are handled at the delivery end. Shearing facilities included in the line are suitable for sheets from 36″ to 192″.

Aetna-Standard's experience with Processing Lines dates back to the earliest production of strip in coils. This experience includes the design and building of many Continuous Electrolytic Tinning, Annealing and Normalizing Lines, as well as Continuous Galvanizing Lines. Aetna-Standard Division, Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh, Pennsylvania.

Aetna-Standard Division
BLAW-KNOX



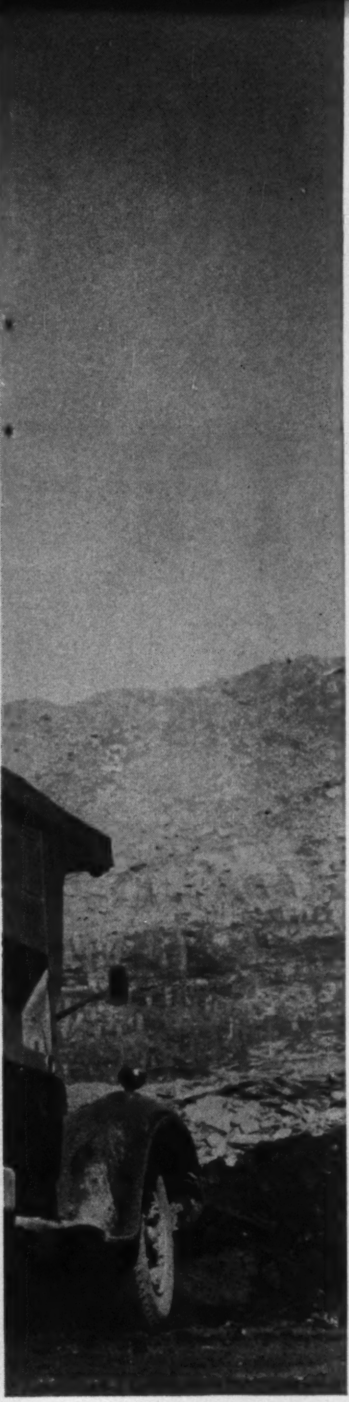
An axle has to be extra tough to take this kind of punishment. Low distortion induction heat treating makes it possible.

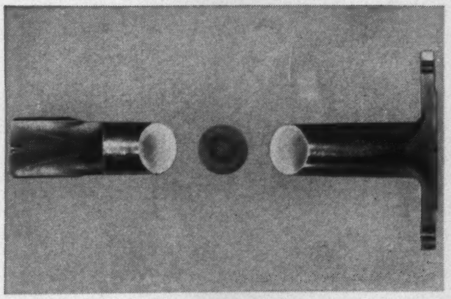
Why International Trucks shoulder bigger loads

Conventional heat treating just wasn't good enough for International Harvester's Fort Wayne Works. They wanted a process that would increase axle strength with minimum distortion. That's why they installed Westinghouse low distortion Induction Heating equipment at the Ft. Wayne truck plant.

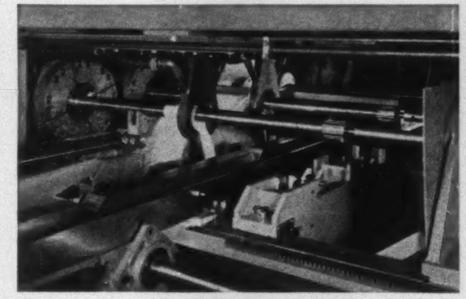
More than **150,000** IH truck axle shafts have been hardened with Westinghouse equipment, and none have required straightening!

Higher cost? Not with this new Westinghouse equipment. This method of induction hardening actually cuts costs . . . two ways. First, no cold straightening is required. Second, tests prove that axles made with 1041 carbon steel induction hardened with Westinghouse low distortion equipment are 100% stronger than axles made with higher-cost 4150 alloy hardened in a furnace. Westinghouse low distortion Induction Heating can bring you lower material and handling costs, fewer

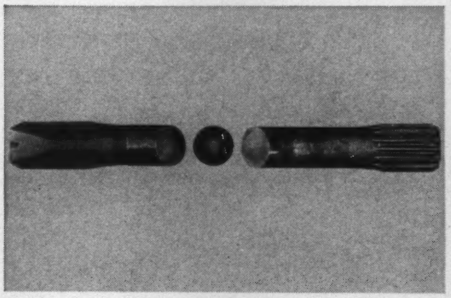




Westinghouse low distortion induction heating on a typical axle provided tensile strengths up to 290,000 psi using 1041 carbon steel. This compares with 185,000 psi using 4150 alloy and furnace heat treating.



The rugged Westinghouse Induction Scanner installs directly into the production line. No warm-up time required, no hot stock inventory. Equipment can be made to match your present and future production requirements.



Westinghouse induction heating offers more precise control of heated depth making it possible to replace a furnace treated alloy steel with a low carbon type.

without Axle Failure

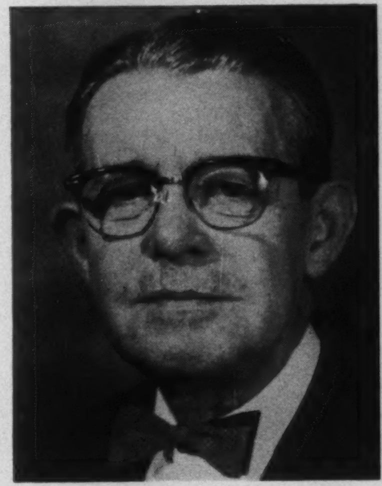
replacements, and more satisfied customers. For details, call or write your Westinghouse representative, or Westinghouse Electric Corporation, Industrial Electronics Department, Baltimore 3, Maryland. You can be sure . . . if it's Westinghouse.

Westinghouse

J-35016

(Continued from P. 72)

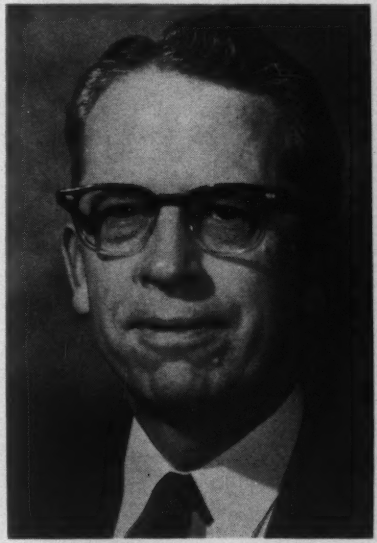
tor Co., Datamatic Div. — **T. H. Wilder III,** appointed manager, San Francisco branch sales office.



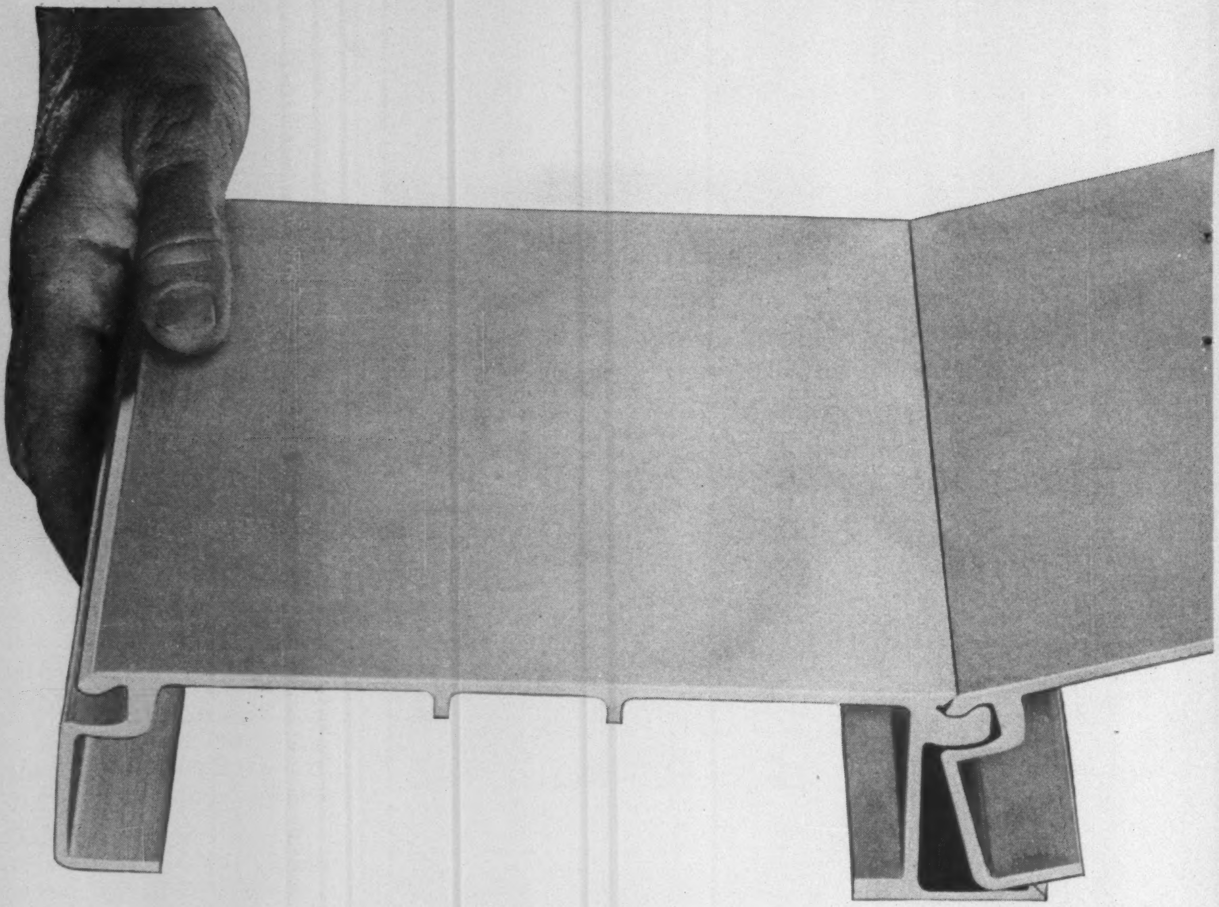
S. L. McClurg, named asst. to manager, tin plate sales, Weirton Steel Co., Div. of National Steel Corp.

Imperial Brass Manufacturing Co.—**M. J. Butler, Jr.,** appointed manager, marketing services.

Hooker Chemical Corp., Durez Plastics Div.—**N. H. Kirchgessner,** appointed production superintendent, chemicals, North Tonawanda, N. Y., plant.



W. S. Dorrance, named manager, Tin Mill Products Div., Order Dept., Weirton Steel Co., Div. of National Steel Corp.



New way to build a box–or a wall Reynolds Aluminum Snap-Lock

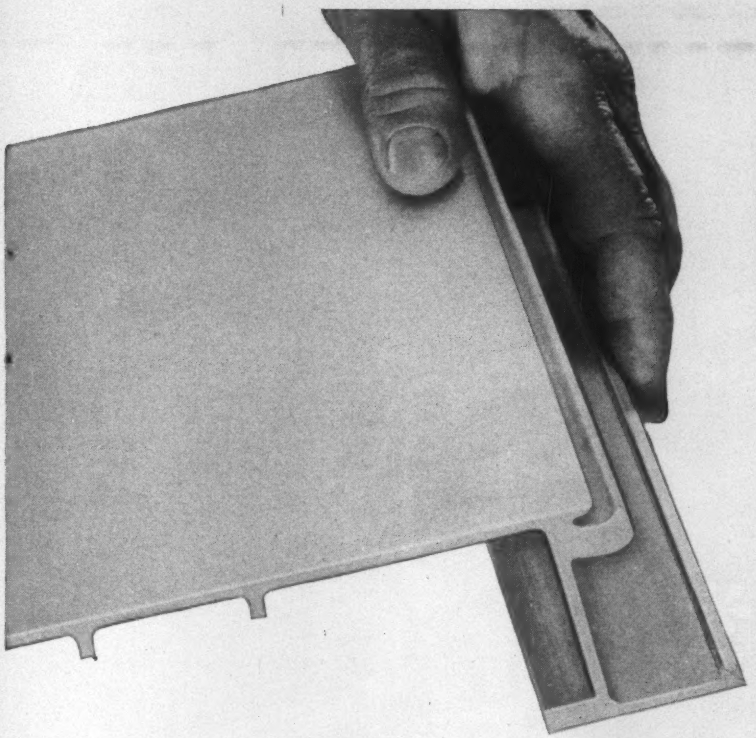
Here's a new, cost-cutting way to put a panel together—a panel made with strong lightweight, rustfree Reynolds Aluminum. The new fabricating method: Reynolds Aluminum *Snap-Lock* Extrusions.

With these extrusions, and their exclusive interlocking design, you can build a strong, rigid wall, or floor, or panel by just *snapping* sections together. You eliminate a lot of welding and a lot of rivets; and the joints are secure, strong, and permanent.

The panel you build with Reynolds interlocking extrusions is really solid, because the design provides an integral reinforcing brace at every joint . . . or between joints as required. Chances of a Snap-Lock Extrusion panel warping or buckling are virtually nil.

You can achieve major production savings with fast, efficient snap-lock fabrication methods, but the savings don't end there. With Reynolds Aluminum extrusions, you can prefabricate sections of panels conveniently in a shop, assemble or erect the sections easily and quickly at the job site.

Although the basic idea behind all Reynolds Snap-Lock Extrusions is the same, the design can be varied to meet specific job requirements. Already, variations of the interlocking extrusion idea have proved themselves, in production and performance benefits, in such wide-ranging uses as electrical substations, truck and refrigerator car flooring, ship deckhouses, airplane hanger doors, and temporary or portable tool houses.

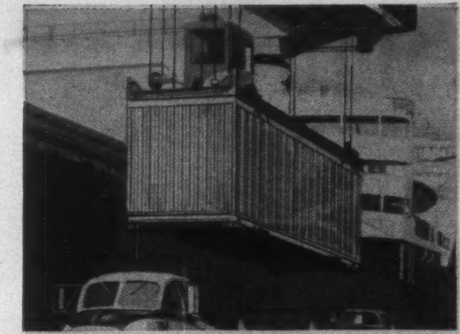


(don't weld it or rivet it . . . snap it!)

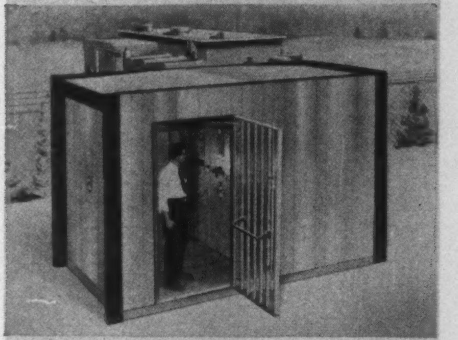
–or a floor Extrusions

If you have a "box" to build (from a small container to a warehouse building) or a floor or a panel of any kind, see how many rivets you can save, and how much welding. Investigate Reynolds Aluminum Snap-Lock Extrusions. For details, contact your local Reynolds office, or write *Reynolds Metals Company, P.O. Box 2346-GN, Richmond 18, Va.*

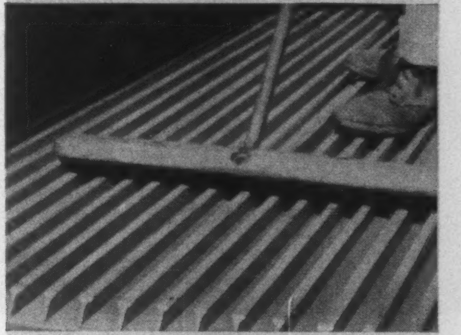
Watch Reynolds new TV show "Harrigan & Son", Fridays, starting October 14; also, "All Star Golf" Saturdays, resuming October 15—ABC-TV. And on Sunday, October 16, be sure to see the exclusive showing of America's new 1961 cars on The National Automobile Show, direct from Detroit over CBS-TV, 6 to 7 P.M. EDST.



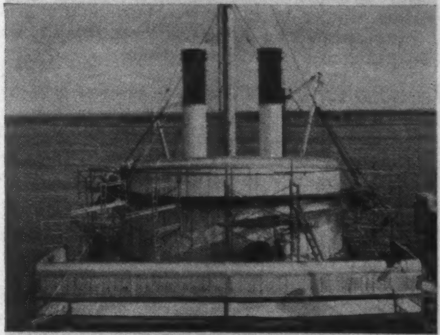
Containers made with Reynolds interlocking extrusions combine aluminum's light weight with extra strength and rigidity.



Electrical substation built with Reynolds interlocking extrusions is strong, rigid, thanks to integrally-reinforcing extrusion design.

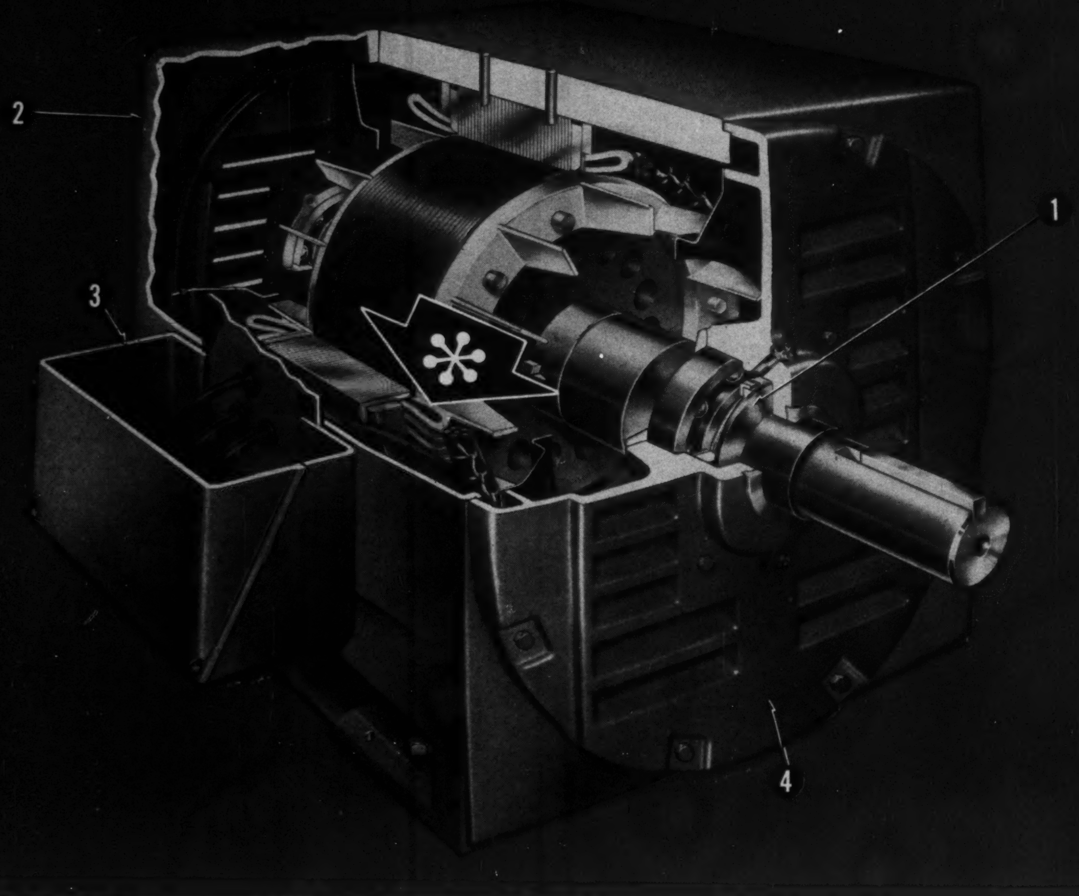


Truck flooring made with Reynolds extrusions is available in a range of designs using interlocking principle.



Reynolds interlocking extrusions cut welding time, fabrication and erection costs in construction of water-tight ship deckhouse.

[illegible] CUSTOM DESIGNED FOR THE METALWORKING INDUSTRY



1 NEW "POSITIVE-PURGING" BEARING SYSTEM utilizes a rotating slinger to purge bearings of old grease and inhibit grease seepage along the shaft. Readily accessible grease fitting cuts maintenance time.

2 RUGGED CAST IRON FRAME is built to give maximum protection on toughest jobs—frames are factory tested to withstand shocks in the magnitude of 20G. Shaft diameters have been increased in size to provide the strength and rigidity demanded by tough metalworking applications.

3 EXTRA LARGE CAST IRON CONDUIT BOX simplifies installation and maintenance.

4 NEW, FLAT, CAST IRON END SHIELDS are designed for durability, yet offer the lightweight, easy removal features which can cut hours and dollars from your maintenance schedules. Angled louvers assure both the effective protection and the maximum ventilating efficiency demanded of motors for metalworking applications.

IN ADDITION TO THE SPECIAL METALWORKING MOTOR FEATURES mentioned above, CUSTOM '8000' motors offer these superior "standard" features: replaceable prewound stator cores reduce maintenance costs; frames are designed to NEMA standard mounting dimensions to simplify installation; dynamically balanced, cast aluminum rotor windings and fan provide maximum reliability.

CUSTOM '8000' MOTORS are manufactured to the rigid quality specifications General Electric has adhered to for over 80 years. Today, with the implementation of advanced design and manufacturing techniques, G.E. can accurately and economically *Customize* motors to your specific requirements through utilization of motor components engineered exclusively for metalworking applications.

** Trade-mark of General Electric Co.*

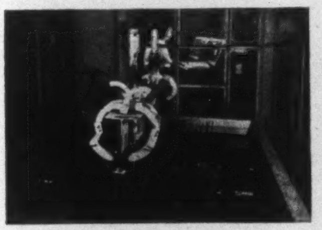
MEDIUM AC MOTOR AND GENERATOR DEPARTMENT

GENERAL ELECTRIC

EXCLUSIVE
POLYSEAL* INSULATION SYSTEM LENGTHENS MOTOR LIFE

General Electric's new Polyseal supported silicone rubber insulation system is highly resistant to contaminants and abrasion—gives maximum winding protection for rolling mills, auxiliaries, punch press and equally tough metalworking applications.

The Polyseal system assures superior mechanical, thermal, voltage and environmental endurance. This form-wound insulation is a vulcanized system "built-up" from silicone rubber tape reinforced by a glass and Dacron† fabric. Polyseal both retains its resilience and provides a positive seal against moisture and contaminants.



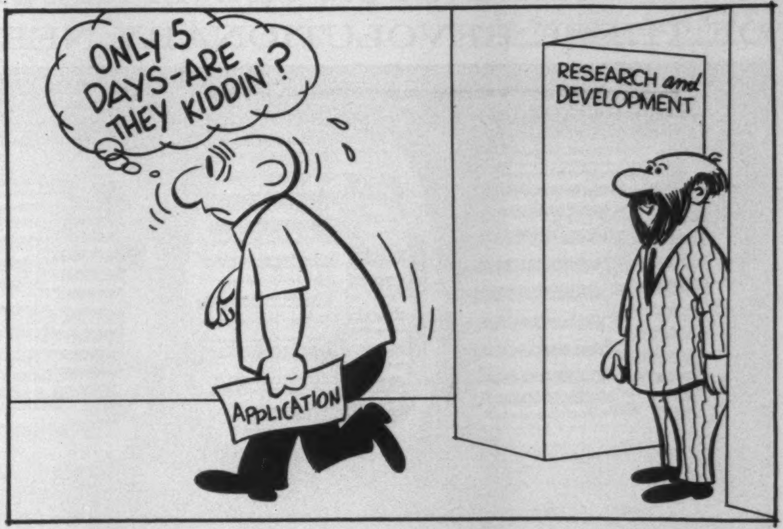
POSITIVE MOISTURE PROTECTION is assured by "under water" production line tests. For example, 2300-volt, form-wound Polyseal coils are water soaked for one-half hour—then "hi-potted" at 8000-volts while still completely immersed—to prove the insulation system is absolutely sealed.

† Registered Trade-mark DuPont Co.

CALL YOUR GENERAL ELECTRIC APPARATUS SALES OFFICE

for full information on CUSTOM '8000' motors for the metalworking industry, or write for Bulletins GEA-6865 and GEA-6889, to Section 884-13, General Electric Company, Schenectady 5, N. Y.

Progress Is Our Most Important Product
GENERAL ELECTRIC



You Arbitrate It!

From the files of
The American Arbitration Association

Five-Day Trial

▪ A manufacturing company's union contract had a promotion clause that read: "Selection will be made from those who apply, based on their seniority and their ability to qualify. Employees selected will be given a trial period of 5 work days within which to qualify for the work assigned."

A job became available in the research and development department. The personnel manager rejected the bid of the senior applicant, a man who had never done any work of that kind before.

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for it in the November 10 issue.

A Clear Meaning — Learning about the nature of the job, the employee withdrew his application. But the union decided to file a "policy grievance."

"You have no right to decide a man can't do the work without giving him a trial of at least five days. That's what the contract says in plain English," argued the shop steward.

"It doesn't say anything of the sort," replied the personnel manager. "A trial period is warranted only where we believe the job can be learned in that period of time. We're the best judges of that."

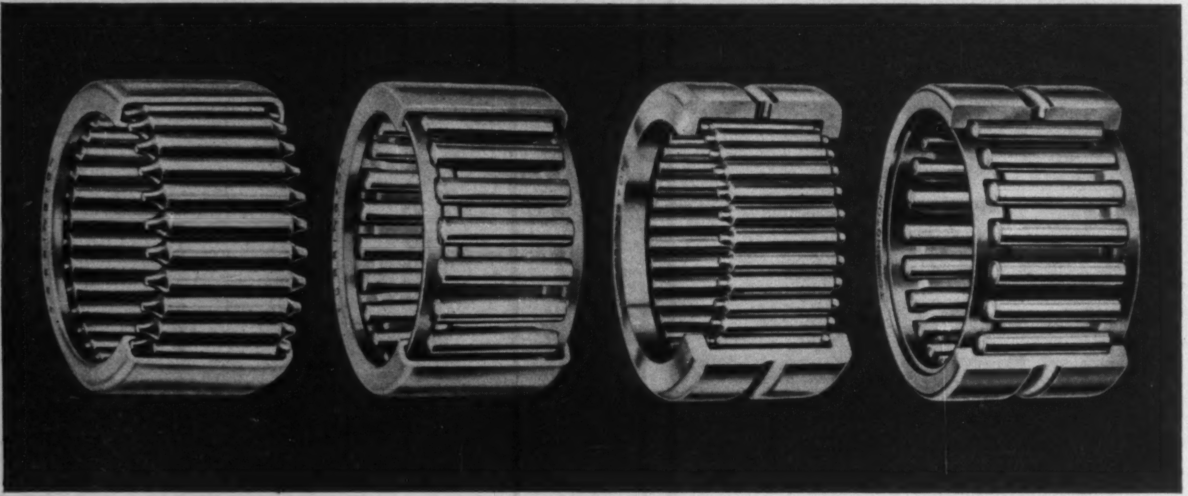
The parties decided to leave it to an arbitrator selected from the American Arbitration Assn's panel to decide what the contract meant. How would you rule?

The Arbitrator Ruled:

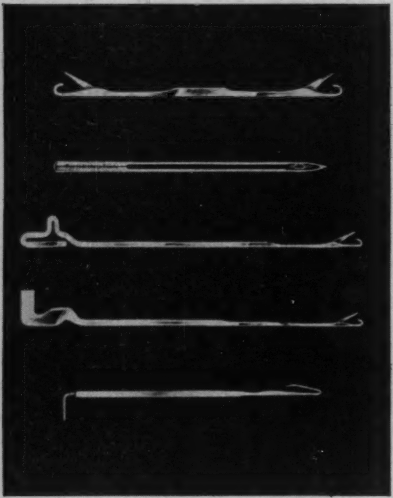
"Before a trial period can be demanded there must be some solid reason for thinking that the employee can qualify within five days. This does not mean that he must be immediately qualified. It means that if his general background in relation to the work to be performed creates a positive and solid doubt in his favor, he must be given a trial."

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.

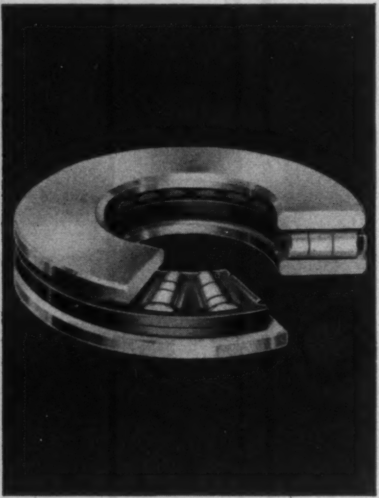
ONLY TORRINGTON MANUFACTURES ALL FOUR OF THESE REVOLUTIONARY NEEDLE BEARINGS...



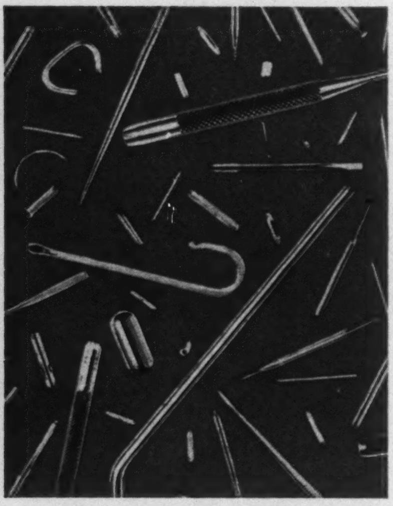
THIS, TOO, IS TORRINGTON



America's largest maker of precision-made machine needles for knitting, sewing, felting, tufting—and a leading producer of surgeons needles.



Specialists in producing thrust bearings of every type, to meet all requirements, from small machine tools to giant radar installations.



America's leading volume manufacturer of small precision metal parts for assembly in a wide variety of industrial and consumer products.

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THROUGH
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Fluidized Bed: New Approach To Rapid Heat Treating

Making its debut soon is a heat treat furnace which embodies a fluid bed.

The fluid bed has many interesting facets. How can they help the heat treater?

By **C. L. Kobrin**
Metallurgical Editor

▪ The fluid bed is no stranger to the metallurgist. Teaming it up with a heat-treat unit, though, represents a new advance in metalworking.

The new unit allows the heat treater to speed up production and improve product quality. It also enables him to perform a number of precise heating and quenching cycles. So claim engineers at the Industrial Heating Dept., General Electric Co., Shelbyville, Ind.

Alike in Some Ways—What is a fluid-bed furnace? In some respects, the new furnace is like other heat-treat units. It takes up the same or less amount of floor space. It performs similar jobs. Initial and operating costs are comparable. Instrumentation and work handling equipment are standard.

Outwardly, the fluid-bed furnace looks like other batch-type furnaces. But, from there on, the resemblance ends.

Agitates the Bed—At the bottom of the furnace chamber is a bed of fine refractory particles resting on a porous plate. Gas, forced up through the porous plate, lifts and agitates these particles.

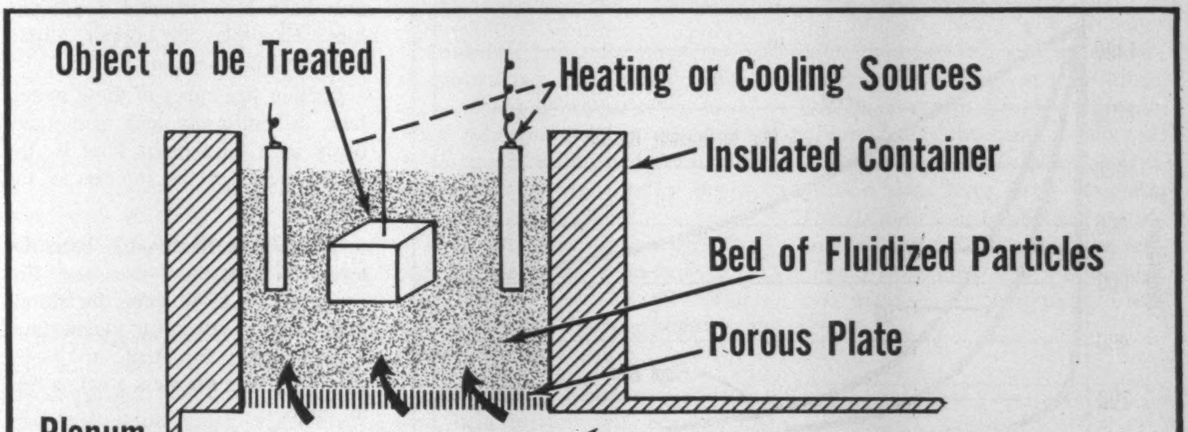
It's in this turbulent fluid-like bath that an object is immersed for heat treatment. For quenching, you can use a similar furnace. But, instead of a heating element, it's equipped with a cooling source.

When a run is over, no post-style cleaning treatment is needed.

Serves Other Areas — The fluid bed is used for some chemical metallurgy processes. Roasting of sulfide ores is one application. The H-iron process uses a fluid bed in its direct reduction of iron ores. Another use is in a new technique which chemically separates like metals such as columbium and tantalum.

It's reported that one manufacturer uses a fluid bed to apply a special coating to objects. How? By using a bed of plastic rather than refractory particles.

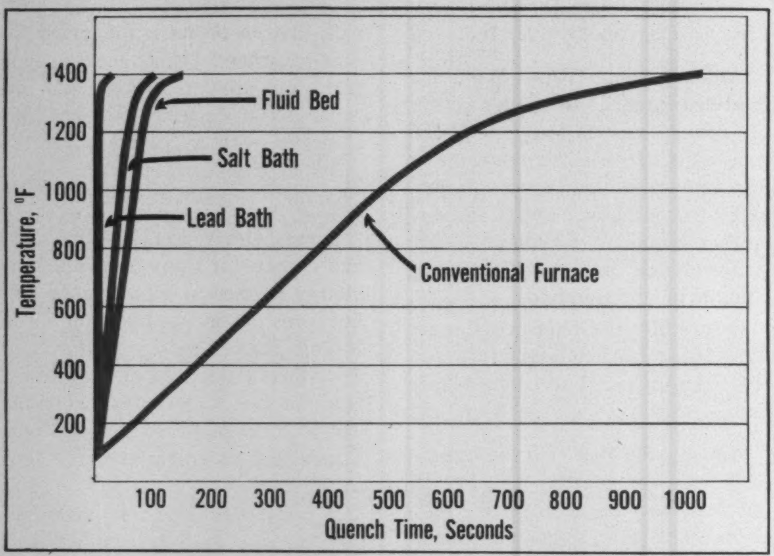
Turbulent Bed Gives Rapid Heat Transfer



What properties of the fluid-bed furnace are most appealing to the heat treater? J. D. Stauffer, advanced research engineer at the Shelbyville plant, makes these points.

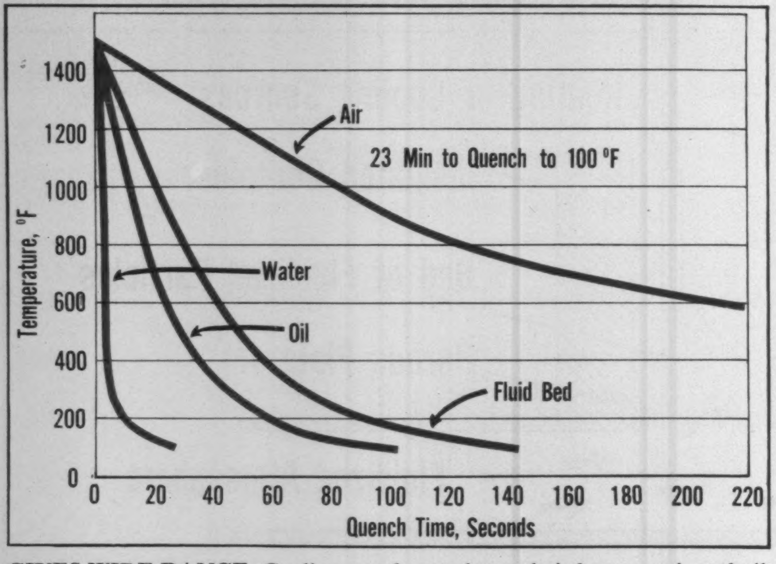
Heats Up Quickly—The fluid bed provides rapid heat transfer between the heating source and the work object. The thermal coefficient runs as high as 130 Btu/hr/sq ft/°F. For the heat treater, this means a short cycle time.

How Heating Rates Compare



PASSES THE TEST: Data, taken from steel sample, show that the fluid-bed heating rate compares favorably with salt and lead baths.

Fluid Bed Plugs Cooling Gap



GIVES WIDE RANGE: Cooling rate for steel sample is between air and oil. If desired, the rate can be adjusted to vary over a wide range of values.

Consider the graphs shown. Test conditions were designed for a rate of only 70 Btu/hr/sq ft/°F. The metal in question was steel. Other metals will give similar results.

Note that the fluid-bed heating rate compares favorably with salt and lead baths. And all three heat up 7-10 times faster than typical convection and radiation methods. The reason: their higher thermal coefficients.

Any Other Rates?—The graph of cooling curves brings up a vital point. It shows that the fluid bed cools at a rate somewhere between air and oil.

This is not the only rate attainable. Many cooling rates can be obtained because heat transfer coefficients of 5-130 Btu/hr/sq ft/°F can be set up for the fluid bed. The same holds for heating.

Thus, the fluid bed offers the heat treater the means to handle certain finicky metals that require precise cycles for getting optimum properties.

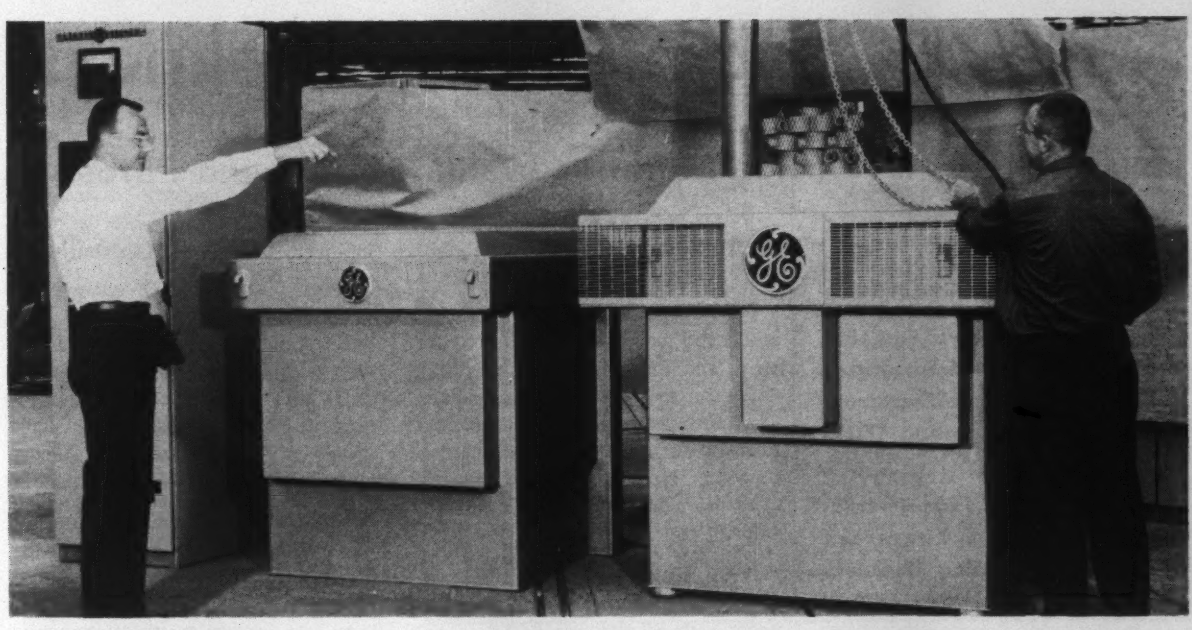
Heats Any Size—Size of objects is no limiting factor. General Electric engineers point out, though, that metals of high thermal conductivity are best. Why? To get maximum heat-up rates.

Ideally, the best metal to work with is a block of silver. However, there are more common metals that also have high thermal conductivities. Examples are copper, aluminum, and magnesium.

Certain size cubes of these metals heat up uniformly and instantaneously in a fluid bed. That is, the center heats up as rapidly as the surface.

Which Are Best?—It's been determined what these sizes are. For copper, it's a 15-in. cube; for aluminum, a 9-in. cube; for magnesium, a 5-in. cube; for steel, a 1⅝-in. cube; and for stainless steel, a ⅝-in. cube.

This doesn't mean that only these sizes of cubes reap the advantages of the fluid bed. Larger parts can also be heat-treated in fluid beds. But there will be a slight temperature gradient between the center



MAKES TEST RUN: Data, collected from many test runs, allow GE engineers to correlate preset conditions with heating rates. Furnaces can be adjusted to give a wide range of heating and cooling cycles.

and the surface of the object.

Another factor, Dr. Stauffer adds, is the high turbulence which eliminates thermal gradients. The entire furnace load gets the same heat treatment. Product quality doesn't vary due to hot and cold spots.

What's Involved? — Three major parameters must be taken into account when setting up a fluid bed. They are: particles, gas, system.

Particles vary according to size, shape, density. Choice of gas depends upon density and viscosity. Heat capacity, and thermal conductivity are factors also.

Adjusting the gas flow-rate and the total weight of particles are some ways to alter the system. Changing the type of porous plate, cross-section and shape of furnace chamber are others.

Affects Heating — Consider this example. Suppose an operator speeds up the gas flow. Greater turbulence results and, therefore, greater heat transfer.

Changing the particle size results in different heat-transfer rates. The smaller the particle, the greater is the rate. Since particle sizes range from 50-150 mesh, it can be seen that a fairly wide range of heat-transfer rates are attainable.

Even the depth of the bed, the shape of the object, and its position in the bed have some effects on fluid-bed efficiency.

Increases Versatility—These variables are not intended to confound the heat treater. Instead, as B. A. Ruediger, GE market development, points out, they allow him to perform a variety of jobs.

Annealing or stress relieving of aluminum and magnesium castings is one. Aging of copper alloys is another. Martempering or austempering of steels in the new furnace is also possible. Many other operations can be scheduled.

This batch-type unit is only the beginning for the fluid-bed heat-treat furnace, says Mr. Ruediger. Already on the drawing board is a continuous-type furnace.

Takes Long Lengths — In this unit, heat treaters will be able to continuously strand-anneal lengths of copper wire. Fabricators will find its rapid heating rate useful for heating large extrusion billets.

Another application that suggests itself, adds Mr. Ruediger, is for patenting of steel wire. This operation calls for heating the wire to a point well above the upper critical temperature. Then, the wire must be cooled at a fairly rapid rate to a pre-selected level. There it's isothermally transformed. The ability of the fluid bed to cool at a fast and precise rate points to its use for this job.

For Carburizing Also—What's in the future? Next, will probably come fluid-bed furnaces for carburizing, carbontriding, and nitriding. Design of a unit for high-temperature brazing is also being considered.

To date, a number of batch-type furnace sizes have been designed. The smallest unit has a usable work area of 2 x 2 ft. The largest unit features a work area of 4 x 8 ft. Also available are quenching units of like size.

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X Rays Check Plating Thickness

Emission and Absorption Methods Evaluate Wear and Porosity

By **R. H. Zimmerman**—Assoc. Research Engineer, AMP Inc., Harrisburg, Pa.

X-ray methods are fast becoming the best and sometimes the only means of getting quantitative data on plating thickness.

They are rapid, non-destructive and accurate. X-rays can even measure plating thickness on complex, odd-shaped parts.

▪ Today, the use of precious metals for plating materials is commonplace. The growing need for precious-metal coatings centers on recent advances in the manufacture of small components. Temperature limits and reliability factors have been extended.

As a result, precious-metal coatings, with their freedom from oxides and good corrosion resistance, fill more and more industrial needs.

There are two major reasons why plating-thickness measurements must be accurate. The cost factor is obvious. However, there's another even more important factor to consider.

Vital Cover — Plating thickness affects the plated material. It influences several properties. These include porosity, corrosion, wear and electrical characteristics.

X-ray methods appear to be the best and sometimes the only means of obtaining accurate thickness measurements. These non-destructive methods lend themselves to both research- and production-control applications.

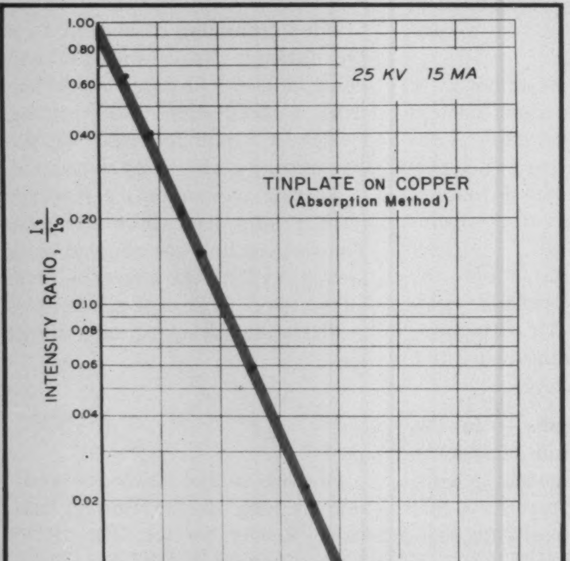
One of the earliest X-ray methods for measuring thickness hinges on the absorption of a substrate-diffraction peak. This method, often used to check tinplate on steel, serves in many automatic X-ray, emission-analysis, control units.

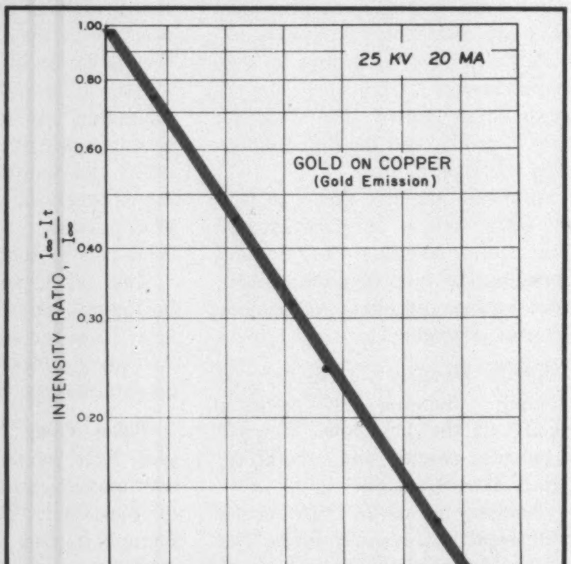
Wide Choice — Modifications of this emission method vary. They include selected excitation, selected filtration, crystal reflection, absorption and emission, electron-probe processes and radioactive-source excitation.

For the past six years, the AMP Inc. laboratory has used X-ray methods to measure precious-metal thicknesses. AMP makes and plates small, odd-sized, odd-shaped electrical parts.

To handle its specialized output, the company developed its own use-

Calibration Charts Show Linear Relationship





Compare X-Ray and Optical Measurements

SAMPLE (GOLD OVER COPPER)	METHOD	DETERMINATION NO.										
		1	2	3	4	5	6	7	8	9	10	AVE
A	OPTICAL	10 *	15	10	10	10	25	30	15	20	25	17
	X-RAY	10	11	9	11	11	13	12	12	12	12	11
	WT.	15	*(GOLD WEIGHED AFTER STRIPPING FROM BASE METAL)*									15
B	OPTICAL	30	40	50	40	45	55	40	35	40	40	42
	X-RAY	28	28	30	28	27	28	27	25	28	26	28
	WT.	31	–	–	–	–	–	–	–	–	–	31
C	OPTICAL	65	70	80	65	80	80	80	80	95	60	76
	X-RAY	51	49	48	49	50	49	52	51	52	50	50
	WT.	53	–	–	–	–	–	–	–	–	–	53
D	OPTICAL	165	180	170	160	165	200	210	180	165	175	177
	X-RAY	142	136	135	140	126	142	134	131	132	140	136
	WT.	–	–	–	–	–	–	–	–	–	–	131

* *THICKNESS LISTED IN MICROINCHES*

ful procedures. For the most part, these include the plating-substrate K (alpha) absorption and the plated-coated L (alpha) emission methods.

AMP also checked out the absorption of the K (alpha): K (beta) ratio of the substrate and the emission of the plating L (alpha): L (beta) ratio.

Prepare Standards — There are many calibration methods. One of the most simple is the gain-of-weight measurement on a known area after electroplating or vacuum deposition. Another easy method covers the loss-of-weight measurement of stripped parts.

Here's how the latter method works. If gold plating over nickel and/or brass is dipped into nitric acid, the substrate dissolves away from the gold. The gold plate can then be weighed.

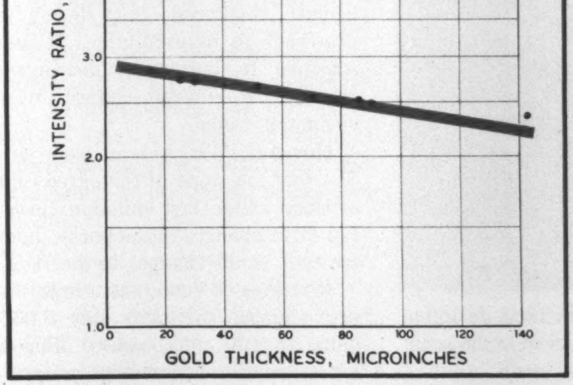
In the case of tin on copper, hydrochloric acid strips the tin with very little attack on the copper. Optical and interference-microscope measurements may also be used.

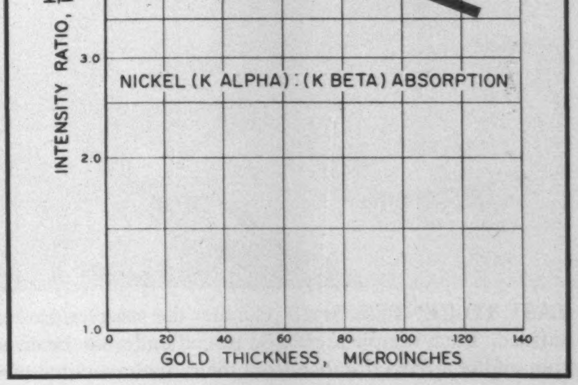
Optimum Sample—One of the best ways of making standards is to plate a large area on a sample, after the back and edges have been masked by tape. This reduces edge effects and gives a more uniform surface.

After plating, disks of 1-in. diam are stamped out with a die. Coating weights are obtained by either a stripping method or by direct chemical analysis. Then the curves are cross checked against optical measurements.

Caution must be exercised, particularly in thicker coatings, for uneven surface plating. The X-ray intensity value may not present a true picture of the average plate thickness. In haste, it's easy to erroneously read a thin area, measured

Some Linear Curves Have More Limited Use





under the X-ray beam, as representative of the entire plate.

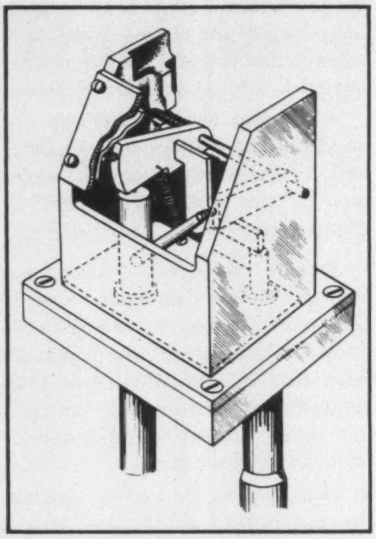
Calibration Curves—In the case of a single metal electroplate over a sample the absorption method appears to be the most accurate. Absorption of the substrate-fluorescent radiation provides a measure of the thickness.

Next, the previously-recorded intensity data of the standards are corrected for background. The ratio of plated to unplated intensities is plotted on semi-logarithmic paper. Both intensity ratios are plotted versus thickness.

Since this absorption follows Beer's Law, a straight-line relationship results. The first chart gives an example of a calibration curve for tinplate on copper. Other absorption-type calibration curves are easy to prepare. AMP Inc. has curves for silver on copper, gold on copper, tin on steel, nickel on copper, palladium on copper and solder plate on copper.

Sensitive Readings — Let's consider the chart that depicts tin on copper. It takes a 1.1 pct change in intensity at 100 microinches to change the measured thickness 1 microinch. Since a 1 pct counting precision is obtained with the available intensity in a short time period, this makes the method very sensitive.

Now, consider the case of multiple platings. Bear in mind that the outer plate is the most meaningful. For rapid analysis, the emission method serves to check multiple platings.



AUTOMATIC ADJUSTMENTS: Micrometer motions are altered by motor drive.

Intensity of the plate's fluorescent radiation is compared to that of a plate with an infinite thickness. In this case, we define infinite thickness as that at which no increase of intensity results for any kilovolt setting of the spectrograph.

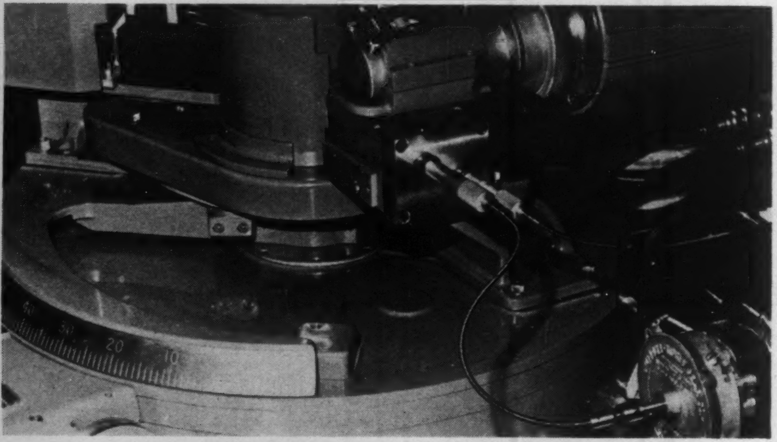
One minus the ratio of the two intensities is plotted against thickness on semi-logarithmic paper. This yields a straight line.

Gold Emission—The second chart gives an example of this method. It shows that with gold on copper, a change of 1 microinch at 100 microinches requires about 0.3 pct change in the gold intensity.

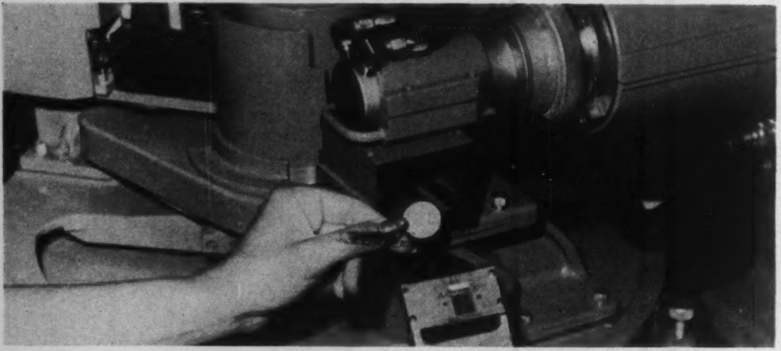
Another emission process which was checked out is the L (alpha): L (beta) ratio of the coating. The third chart depicts this case. This chart plots gold L (alpha): L (beta) against thickness; but there's a drawback to its usefulness. It isn't sensitive to curvature, instrument changes, or kilowatt changes over a limited range.

However, it's obvious from this plot that the slope of the curve isn't as steep as the first emission curve. For large changes in thickness, there are only small changes in the ratio.

A change of 1 microinch in thickness changes the ratio only 0.025 units at 100 microinches. For a 1 pct variation of intensity in oppo-



MICRO-BEAM MEASUREMENTS: Motor-driven micrometers profile wear tracks. The depth, measured by wear cycles, gives a wear rate.



EASY TO CENTER: Small-diameter flat samples present the most desirable surface. Each sample should be placed under the beam—at or near the same spot and at a fixed distance from the radiation-source tube.

site directions for the L (alpha): L (beta) values, a change of 9 microinches results. This indicates less sensitivity for this method.

Check Nickel Thickness—The K (alpha): K (beta) ratio of nickel can be plotted against nickel thickness; but the ratio is not constant enough to preclude nickel variations over the desired thickness range. From 50-300 microinches the ratio changes 0.79 units.

If this change is translated to the last absorption curve, it gives a 32-microinch error. All of this error is due to variations in nickel thickness.

Absorption of the K (alpha): K (beta) ratio by the exterior plate on massive nickel also serves as a measure of gold-plate thickness. A graph of this ratio absorption versus thickness shows that the slope of this line isn't as steep as straight K (alpha) absorption.

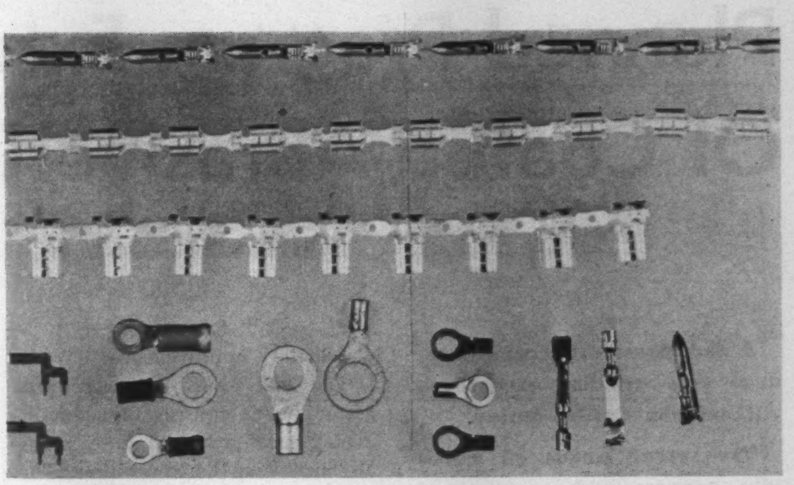
As a result, a change of 0.005 units equals 1 microinch. This explains why the L (alpha) emission and the K (alpha) absorption methods are the best.

Dual Measurements—To measure both nickel and gold at the same time a curve is needed for each gold thickness or range of thicknesses. Lacking a simple method, general enough to measure both plates at any fixed thickness, AMP discarded this approach. Prior to gold plating, nickel thickness is read by absorption of the copper's radiation.

Precision of the X-ray measurements hinges on the counting time. The higher the count accumulation, the lower the error.

Using the second chart, we obtain a reasonable value for gold emission, based on a 1 pct 2-sigma value (40,000 counts). When translated to thickness, this gives ±1 microinch at 30 microinches. At 90 microinches the accuracy equals ±3 microinches. With positioning and curvature errors, these values can double.

Compare Accuracy—A light microscope can theoretically separate or resolve two points on the order of 7-8 microinches. In practice this value is higher. Since the measured area is small, the reading tells very little about the overall surface.



HARD TO CHECK: Accurate measurement of plating thickness is a necessity not only for cost purposes, but also because the plating thickness affects other properties. These include porosity, wear and corrosion.

A table compares microscope measurements to X-ray and weight methods. Because thin areas of plate contribute more intensity than thick areas, the X-ray thickness falls between the microscope average and the minimum values. X-ray thickness correlates well with the results obtained by weight-gain or loss methods.

Now, let's consider size and shape problems. The most desirable shape is flat. However, most of the parts made by AMP have very little—if any—flat area.

Thickness readings are reliable if the curvature is across the beam planes. If a reading occurs in the beam plane, the small radius causes errors. Why? Because radiation from the curvature's rear side has an extra exit path. The result is errors in measurement.

Positive Positioning—Since these measuring methods are comparative, each sample must be correctly positioned under the beam. Make sure all samples are as near the same spot and distance from the tube as possible. Wax impression molds aid in this respect.

Sometimes the gold thickness at a contact point is all that must be tested. In this case, AMP uses steel masks. These masks limit the area to as small as 0.06 in.

By masking down an exposed area, point-by-point thickness checks can be made. These checks show how the thickness varies over the surface. Areas of high-current density are thus found.

Micro-Beam Analysis—An application of absorption methods centers on the use of a micro-beam unit. This unit handles gold-plate wear studies as well as microanalysis work.

In gold-wear studies, the X-ray beam traverses small wear tracks, made by a moving stylus, across both the length and width of the overall track. Motor-driven micrometers give a profile of this wear track.

Depth can be measured by each group of wear cycles. This shows the wear rate.

The overall track is also masked off. Thus, the change of substrate intensity with wear can be counted. This count correlates to the number of cycles and the load for varied hardnesses and types of gold.

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Planned Program Extends Life Of Coated-Abrasive Belts

By **H. L. Weisbecker**—Suprv., Physical Studies, Coated Abrasive Lab.,
Minnesota Mining and Mfg. Co., St. Paul

A dual-phase program can reduce your grinding expenses—without any capital outlay.

The secret hinges on manually-programmed power, and the proper choice of lubricants.

▪ Sheets and coils are ground for one of two purposes: Either to remove surface defects or to insure a high-gloss, ground finish.

Normally, defect removal takes place while the metal is being rolled. On the other hand, production of a ground finish occurs as a final step on material that's already within fixed gage limits.

Dual Service — Coated-abrasive belts serve for both finishing and grinding. The performance of an abrasive belt is judged on two counts: quality and economy.

Analysis of present grinding practice shows a need for more precise control of a belt's performance. Two factors offer wide potential for cost and quality improvements.

The first factor is power programming. It consists of maintaining a constant cutting rate by gradually increasing the power input. This is done by stepping up the pressure between the belt and the metal —as the belt is "worn in."

Power programming allows each belt to remove more metal. Thus, it extends the belt life in direct proportion to the available power.

Water-Base Lubricant—The second factor for cutting grinding costs, while improving quality, lies in the optimum selection and usage of lubricants. Liquid lubricants, used as floods or sprays, yield three-to four-fold improvement over dry grinding.

A case in point is tripotassium-phosphate (K_3PO_4) solution. This solution, developed for titanium metal, acts as a good water-base lubricant when grinding stainless steel. Its performance approaches those of the best cutting oils.

Tripotassium-phosphate solution offers several bonuses. It produces a brighter strip from the same grinding unit along with a cleaner area. Use of the water solution also prevents the buildup of hazardous residues in the grinding room.

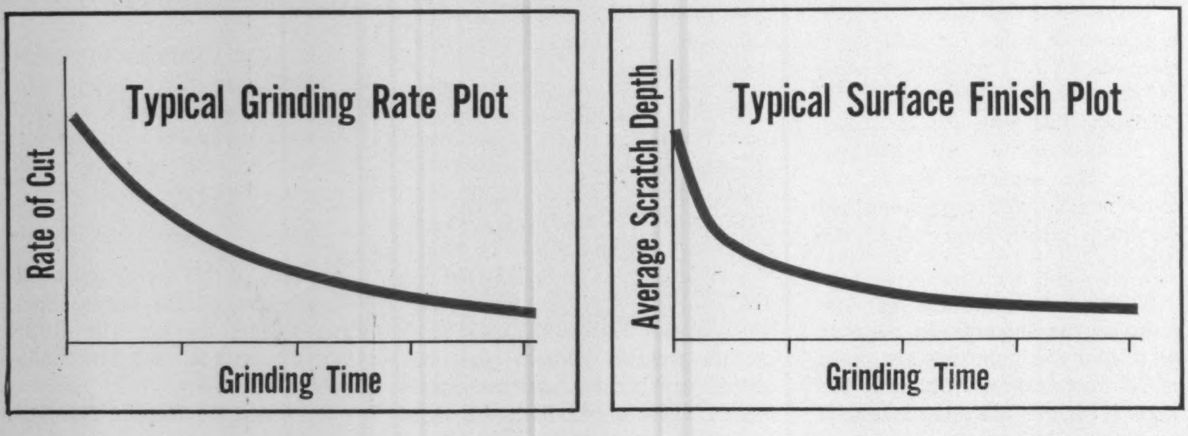
Costs Tumble—On titanium, this water-base solution has been widely adopted throughout the industry. As a result, abrasive costs have tumbled 67 pct.

Now let's consider quality. The quality of a ground coil or sheet is judged visually. Common practice is to grind until a satisfactory finish is obtained. Often, several passes are needed to obtain a good finish.

The operator replaces abrasive belts when he sees fit. In other words, belt renewal—which affects a coil's final finish—takes place at the operator's discretion and/or convenience.

Replacement Problem — If the operator is lax in replacing a belt,

Cut Depth Drops Off as Time Progresses



the work will have to be reground. Why? Because the cutting rate drops off as the belt wears. When the power rate is fixed, worn belts do not remove enough metal.

New belts cut much faster than old belts. This can also create headaches. If a new belt overcuts the stock, more problems crop up. The result is waste in time or stock—or both.

Power programming has several inherent advantages. It insures a more uniform rate of stock removal from one end of the coil to the other, or from one sheet to another. This precludes the need for recycling of a coil, or a stack of sheets, in order to pass inspection.

Compensate for Wear—As a coated-abrasive belt wears, the mineral grains become less sharp. Load programming compensates for this wear. It even makes it possible to specify the number of passes that should be made with each belt.

Most sheet and coil grinders operate at only about 30 pct of their rated horsepower. Yet, with modern coated-abrasive belts, it's almost impossible to apply too much horsepower per inch of belt width. Hence, about two-thirds of the horsepower of the average grinder isn't used.

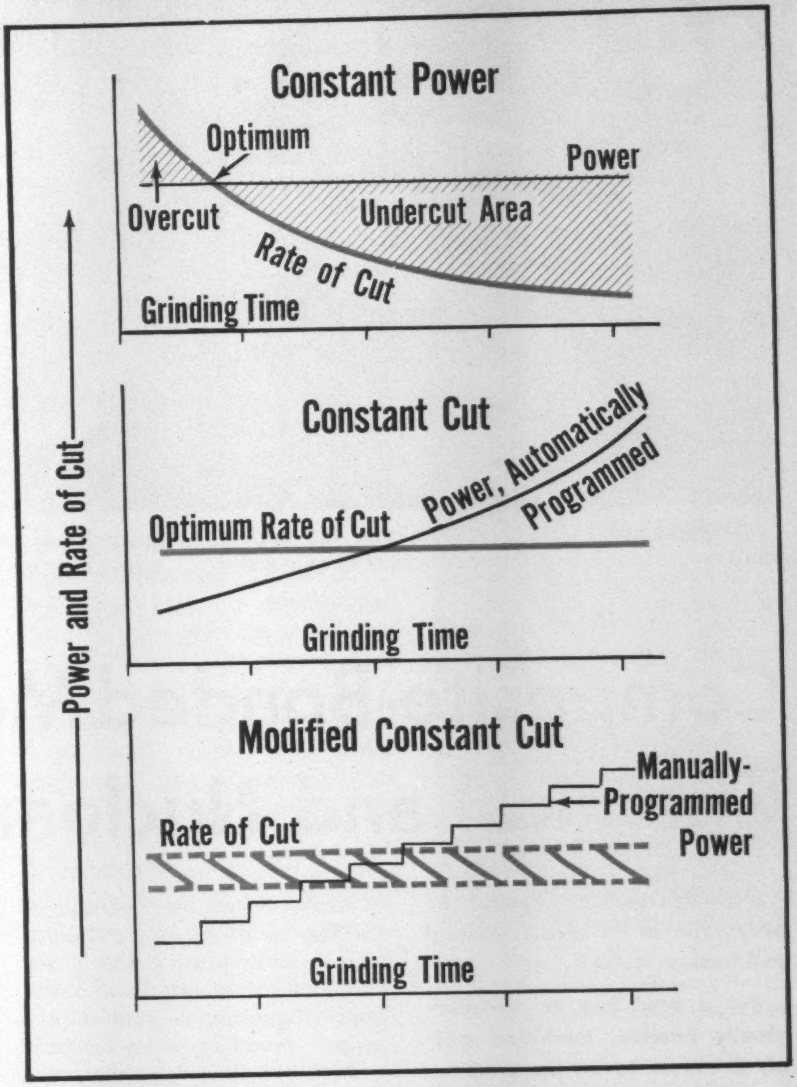
Start a Program—It's easy to set up a power-programming system. First, you should determine the optimum cutting rate. This will most likely be based on a rate of cutting that occurs early in the life of the abrasive belt.

Several factors must be considered in setting up your program. The lubricant has to control burning under various grinding pressures and cutting rates. Maximum scratch depth must also be known.

Having specified a rate of cut, the next step is to establish an initial power reading that's equal to the desired cutting rate. Use an ammeter to read the power.

In developing your program, specify a fixed initial amperage reading and a fixed rate of amperage increase as a function of grinding time or number of passes.

Control Your Grinding Rate

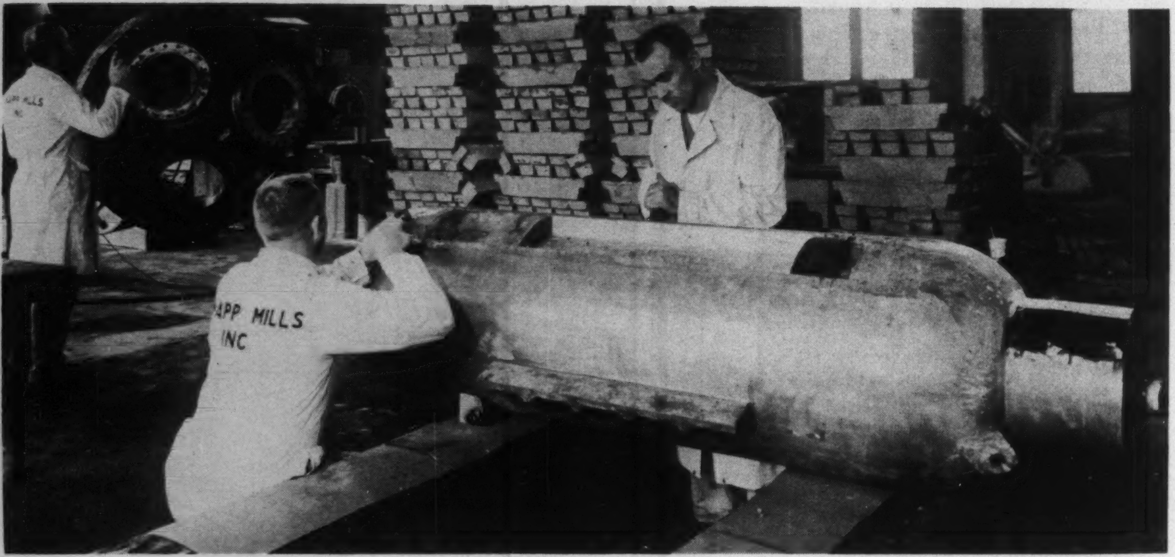


Good to the End—With this system, the "end point" of a coated-abrasive belt is reached when it becomes impossible to maintain a fixed cutting rate. However, the end point may be due to factors other than belt wear. These factors include the power limit of a given machine and workpiece discoloration that's caused by heat.

Lubricants can control the heat; but they also affect the rate at which the belt dulls. This reduces the rate-of-power increase needed to maintain consistent abrasive performance.

After the original cut-per-pass rate has been determined, and the power requirements for this amount of cut are known, calculate the power increase. If, for example, the initial amperage reading yields a cut of 4 oz per pass, then the amperage must be increased when the rate drops to 3 oz.

Automated power programming can be adapted to any wide-sheet grinding and polishing line, at little cost. Or it can become effective immediately on a manual basis.



UNDERWATER USE: Demineralizers for nuclear ships range from 3-5 in. thick. They remove radioactive minerals and foreign particles from the reactor-cooling water. This action reduces the radiation level.

Composite-Bonded Metals Resist Chemical and Nuclear Attack

No single material has all the properties of an ideal chemical and nuclear shield.

But a new line of metallurgically bonded, lead-clad metals promises to fill the void.

▪ Shielding in the nuclear and chemical fields offers great challenges, problems and opportunities.

No single material has all the desired properties of an ideal shield. Among the prime needs are gamma and neutron shielding, structural strength and stability, corrosion resistance and heat-transfer ability.

Since no material meets all these needs, multi-functional combinations of materials must be formed. Lead plays the major role in creating these hybrid shields, at the Knapp Mills Inc., Long Island City, N. Y.

Multifarious Hybrids—This work at Knapp centers on "international shielding metals," known as Insmetals. Presently being produced are: Bauxilum, a lead-surfaced aluminum; Cupralum, a lead-surfaced copper; Ferrolum, a lead-surfaced carbon steel; Inslead, a high-density shielding lead; Nicrolum, a lead-surfaced stainless steel or nickel alloy; and Ferro-Nicrolum, a lead-surfaced, stainless-clad steel.

Lead itself possesses excellent gamma-shielding properties. It also resists corrosion and has fairly good thermal conductivity. However, lead has certain deficiencies. It isn't effective as a neutron shield and it doesn't have good strength.

Combinations of lead-lithium or lead-boron yield good gamma-neutron shields; but in the former case the shields give poor corrosion resistance. In the lead-boron team the elements will not readily alloy. Hence, they're difficult to combine and fabricate. Laminates of lead and paraffin wax or polyethylene provide composite gamma-neutron shields.

Major Problem—Now, let's consider the mechanical strength of lead. This is its biggest problem. The solution lies with composite metals. Glass and ceramic fibers have been successfully introduced into lead, but the results are far from perfect.

Here's a few of the drawbacks of vitreous- and fiber-metal composites. These composites have marked anisotropy. This means they possess directional-dependent properties. They also exhibit poor wettability between the fiber and the molten metal. This makes it very hard to process vitreous- and fiber-metal composites.

The best high-strength shields consist of composite-bonded metal layers. However, methods must be found to preclude voids in these lead-clad shields. These methods must also insure sound metallurgical bonds between the metals.

These objectives have now been achieved at the Knapp Mills. As a result, lead-clad metals withstand thermal cycling—and fatigue limits have been extended.

Alloyed Bonds — Knapp applies lead to the selected base metals with a true alloying at the interface. This improves the mechanical strength of the lead. In addition, the coefficient of expansion of the base metal becomes the controlling factor in both thermal and mechanical cycling.

Several base metals can be metallurgically bonded to lead. These metals include: aluminum, copper, steel, stainless steel and nickel alloys.

These lead-clad metals give the designer many advantages. All of the hybrids possess the gamma-shielding and corrosion-resistant values of lead.

Lead on Steel—When lead is applied to steel, it gains strength and becomes easier to form. Application to copper also increases the lead's strength—to a lesser degree. However, of more importance, the copper improves the lead's electrical and heat-transfer properties.

If the base metal is stainless steel or a nickel alloy, several advantages are gained by the lead-clad metal. Again, the base metal boosts the strength of bonded lead. Heat transfer is good, but other factors are even more important.

With stainless steel or nickel, decontamination problems are eased. These base surfaces resist corrosion from a wide variety of acids and chemicals.

Shields Aluminum—In the case of aluminum, the leaded hybrid features added strength, good heat-transfer and electrical properties and a low neutron-capture rate.

A. P. Knapp, chairman, Knapp Mills Inc., says that his company uses a patented drawing process to metallurgically bond lead surfacing to the various metals.

Lead surfaces are applied to steel and to stainless steel by very few other American companies. Methods and processes vary. However, in all cases, the bond between the metals inversely affects their usefulness.

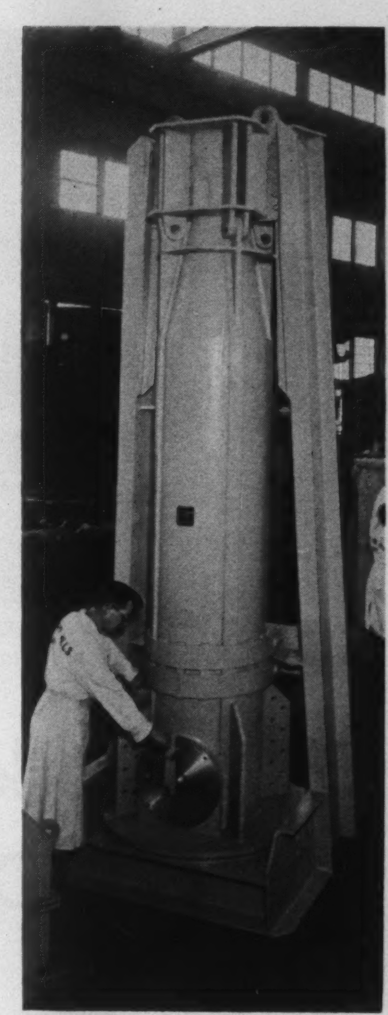
Most procedures are such that the range of products or total output is limited. Why? Because most companies employ extensive hand work. Naturally this results in high costs.

Lead-clad metals offer almost unlimited uses. They even resist irregular forms of corrosion, such as pitting attack, stress-corrosion cracking and hydrogen embrittlement.

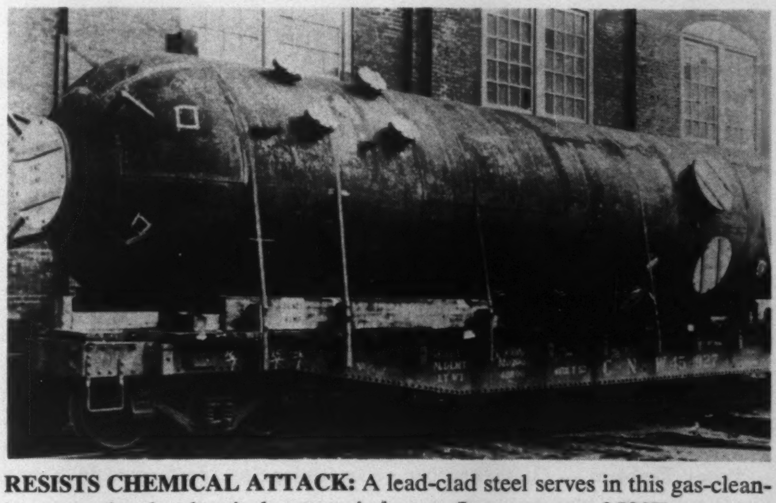
Ultra-Dense Lead—On the other hand, Knapp's Inslead serves in applications where a metallurgical bond is not needed between the lead and the base or supporting medium with which it's employed.

Inslead is made by a new directional-shrink-cooling process which imparts full density to the lead. This high-density lead is economical and easy to maintain.

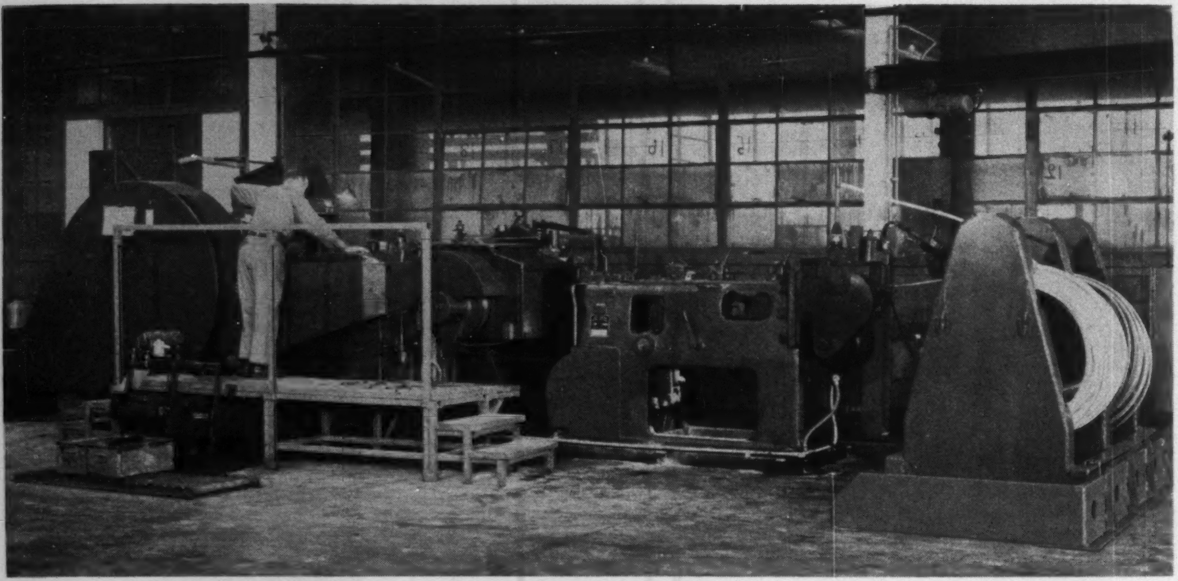
In addition to its corrosion and gamma-shielding values, Inslead has other desirable features. It possesses ductility, workability and weldability. Thus, it may readily be shaped to fit inside any structural support.



HANDLE RADIOACTIVE RODS: Removal device for radioactive control rods insures optimum safety.



RESISTS CHEMICAL ATTACK: A lead-clad steel serves in this gas-cleaning tower for the chemical-process industry. It operates at 350°F.



AUTOMATED UNIT—Bolts take form with a series of manufacturing steps: extruding, cold heading and rolling.

Cold-Worked Stainless Fastener Reduces Design Problems

Standard fasteners are designed to simplify production methods.

However, some jobs require ulterior strengths and corrosion resistance.

Cold-worked stainless has an answer for both needs.

■ Although cold heading, extruding and rolling of stainless steel wire is a fairly recent art, technology is well advanced in certain applications. This is particularly true where heat-treatable grades of stainless are used for ease of forming.

In such applications, know-how acquired over many years of working with low and medium carbon steels and other heat-treatable materials can be put to use.

Poses Problem — Quite another situation exists, however, where a non-heat-treatable material such as an austenitic grade of stainless steel is used. Austenitic stainless steels respond to cold work resulting in higher strengths.

This same response to cold work creates problems when the material is cold headed, extruded and rolled. These problems are being overcome at Huck Mfg. Co., Detroit, in production of the Huckbolt fastener.

To be functionally effective, the Huckbolt pin must break during normal installation. This occurs within a carefully controlled range of loads. Preset rolling pressure forms the breakneck groove which in turn controls breaking loads.

How It's Formed—The pin takes shape through a series of manufacturing steps, involving cold heading, extruding and rolling. The first two operations are performed in a cold heading machine.

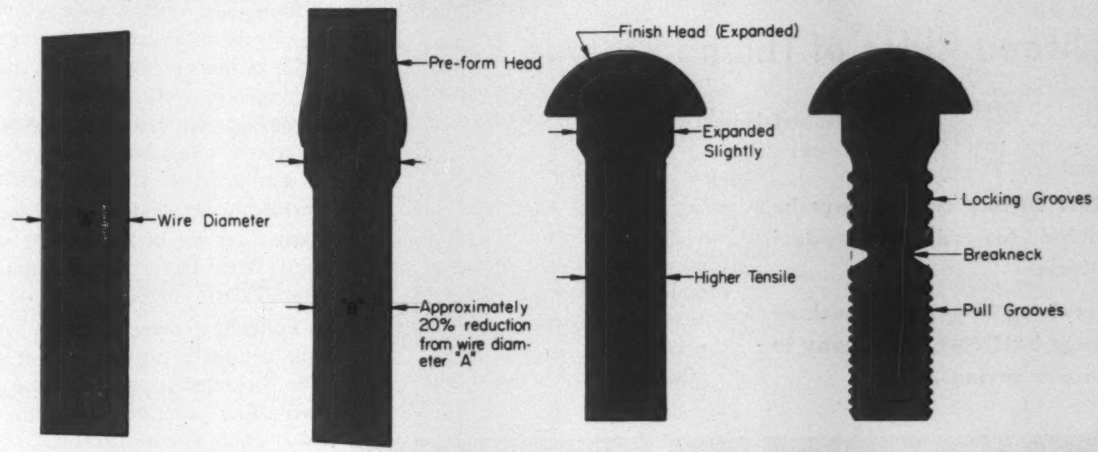
The pintail portion is extruded and is the first section to be formed. Its diameter corresponds to the pitch-diameter section of a conventional bolt that is roll-threaded.

A single pass through the rolling dies forms all the necessary grooves. Despite the depth of roll needed to produce the breakneck groove, a continuous unbroken metal flow pattern is achieved in the material.

Offers Advantages—If the austenitic grade of stainless steel creates so many problems, why use it at all? Huck cites two basic reasons for selecting Type 304 stainless. It eliminates the need for heat treatment following the forming operation and it has excellent corrosion-resistance properties.

The Huckbolt pin as rolled has a minimum shear strength of 70,000 psi and a tensile strength in excess

Fastener Takes Shape



ROLLED GROOVES—Once the pin is extruded and cold-headed, the shank is rolled to produce annular grooves. The breakneck diameter is a reduction of about 50 pct from the original diameter of the wire.

of 100,000 psi. The pins are produced from wire, 5/32-¾-in. in diameter.

The material's 18.0 pct chromium and 9.0 pct nickel make it a desirable choice for use in corrosive environments.

Lube Prevents Galling — Poor lubrication on the surface of the stainless steel wire creates a problem in any heading operation. A generous coating keeps the wire from making direct contact with heading, extruding and rolling dies.

Any direct contact produces galling of the metal, resulting in die damage and production down time. Metallic imperfections could easily cause galling in spite of the lubricant coating.

Where the cold-formed part is produced by upsetting alone, surface lubrication is less critical. Where extruding is also involved, as in the case of these fasteners, the lubrication problem is more severe.

Length of the extruded section is also a factor. The greater the length, the more critical the lubricant needs.

Studies Lubricants—Copper plating is currently being used as a lubricant, but other possibilities are continually being researched. Oxalate coatings proved successful for Huck in cold heading applications involving small diameter fasteners.

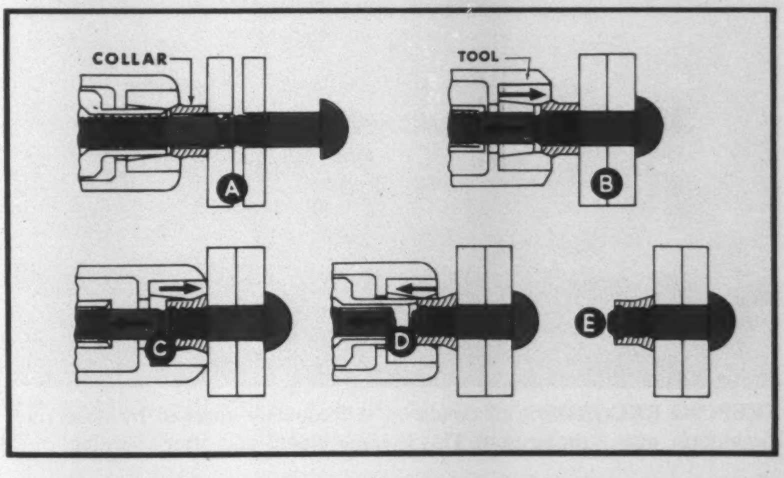
For the present, however, it does not appear to hold the answer for the full range of diameters for the Type 304 stainless steel. Current specifications call for 0.0002-0.0003 in. of copper coating.

With this thin plate, however, defects are sometimes found because of the difficulty in plating a coiled material. In some cases, actual bare spots exist.

To minimize galling problems due to bare areas, current thinking favors heavier copper plate, perhaps as high as 0.0005-in. thick.

The only possible drawback with this solution is a dimensional one. The unusually close tolerances which must be maintained in the extruding dies may not permit a 0.0002-in. increase in lubricant thickness.

How the Bolt Functions



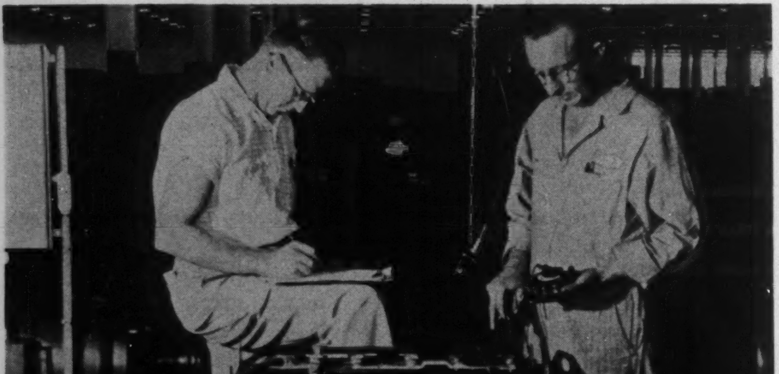
Battery Service Sparks Savings

Eighteen Rules of Thumb Prolong Battery Life

By **Robert Hopewell**—Mgr., Field Engrg., Gould-National Batteries, Inc., Trenton, N. J.

Cost cutting can't always be directed toward the product produced.

Servicing shop items, such as storage batteries, is one way to realize a savings.



KEEPING RECORDS: Cell condition is frequently checked by observing the voltage with a probe unit. This is done before and after charging.

▪ Transporting materials throughout the plant to where they're needed is the lifeline of our modern production system. Many types of battery-powered trucks perform this service.

The truck and batteries represent an investment, and as such, should receive service of the highest standard. When battery life is extended, overall costs tumble.

Following preset service rules will definitely prolong power life. The prorated cost difference between four years of battery life and six or more is considerable.

Proper Selection—Check the capacity need of your truck and install only a battery that can handle the load. Trying to get by with an undersized power source often leads to excessive downtime.

It should be remembered that the battery supplies power for peakloads at any time during the shift. It's easy to find extra uses for battery-powered equipment.

Substituting a smaller battery almost always results in its being overworked. The overdischarge lowers battery efficiency. Use of interchanging spares prolongs battery life. As a guide, an average of 2.1 batteries per truck handles three shifts.

Centralize Authority — Put one man in complete charge of battery operations. He should be well-versed in battery technology—with emphasis on charging and maintenance methods.

To keep batteries in top shape, set up a maintenance and inspection schedule. Batteries should be cleaned often. How often? This depends upon the atmospheric and other conditions under which a battery operates.

Keep Records—Compile a check list so that inspection is complete. For example, vent plugs should be kept tightly in place. Add water to replace evaporation loss. Check the voltage of each cell at least once every three months, preferably once a month after an equalizing charge.

Identify each battery and truck by number. Proper identification provides an accurate account of the check-data such as, date of charge, time, amperes, and specific gravity at the beginning and end of charge. Remember, records help management budget for future battery needs.

Do Not Overcharge — Battery overcharge results in gassing, overheating and loss of water from the electrolyte. Constant overcharging destroys some elements of the battery.

Booster charges sometimes are necessary when trucks are doing extra-heavy work. To prevent overdischarge of the battery, apply a brief charge during a lull in the work cycle (during the lunch period). This prevents unnecessary downtime.

An equalizing charge should be given at least once a month. This additional shot of three or four hours brings each cell up to full charge.

Locate Properly — Charging stations placed strategically offer considerable savings. In large plants, it may be better to locate small charging stations in outlying departments.

If a large central station is installed, it should be placed so that all trucks travel about equal distances for charging. Keep in mind that central charging is easier to supervise.

In some plants batteries are delivered by a trailer to the handling trucks in their work area instead of having the trucks come to the charging room.

Charging Control — Although charging equipment today is largely automatic, it must be correctly set for the size of each battery. Voltage-relay timers should be checked frequently.

If the ampere-hour method of

QUICK BOOST: Batteries for electric hand trucks are charged at small stations within the working area. Note rollers for ease of handling.

GOULD
Thirty
LE

PREVENTING TROUBLE: Dependable battery performance and long life are the results of good maintenance practices such as regular cleaning.

controlling the charge is used, the men must be thoroughly familiar with meter charts. Otherwise, the battery will be either seriously overcharged or undercharged.

Make frequent checks on ammeters and volt-meters. Serious inaccuracies will show up during charging; but small errors can go unnoticed. Over a period of time, the latter leads to less efficient charging. This reduces battery life.

These Rules Are Money Savers

1. **Select Batteries of Adequate Capacity**
2. **Delegate Responsibility**
3. **Inspect on Schedule**
4. **Keep Records**
5. **Avoid Overdischarge**
6. **Do Not Overcharge**
7. **Give Booster Charges**
8. **Schedule Equalizing Charge**
9. **Choose Proper Location**
10. **Maintain Schedules**
11. **Understand Charging Control**
12. **Inspect Meters**
13. **Charge Idle Batteries**
14. **Make Repairs Promptly**
15. **Replace Old Batteries**
16. **Equip Battery Room Properly**
17. **Use Care in Handling**
18. **Enclose the Battery Charging Area**

SCHEDULING TIP: A standard time clock and time cards provide a unique method of keeping accurate, fool proof records on batteries.

Watch Storage—Charge idle batteries once every three months. If this isn't done, the battery discharges itself by internal action. A lead sulphate film forms on the plates. This film hardens and impairs the efficiency of the battery.

Battery repairs are sometimes necessary because of cracked containers, internal shorts or rough handling. When inspection reveals a damaged cell, repairs should be made immediately.

If damaged cells are not repaired or replaced at once, the battery does not deliver full capacity. As a result, undamaged cells must work harder to make up for those that are defective.

Efficiency drops rapidly after a battery delivers less than 85 pct of its rated capacity. When this point is reached, the battery should be replaced to prevent work stoppages. This also precludes extra charging.

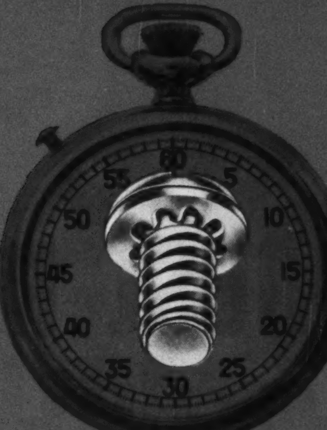
Properly Equip—In addition to a small office for record keeping, the battery room should have a means of moving batteries to and from charging units. A set of standard and special tools speeds battery adjustments and repairs.

Spare parts put damaged cells back into service quickly. Water and compressed air for cleaning are useful. Distilled water, if local water is not usable, is a must.

Always lift a battery with spreader bars. This keeps the lifting force on the battery box vertical. The use of chain slings bends the battery box. Protect charging equipment from damage, by trucks, by using railings, concrete curbs, or other means.

If possible, enclose the charging area with a heavy wire grill. This prevents unauthorized personnel from tampering with batteries or equipment.

SAVING
TIME
ON
THE
LINE



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PERMIT HOPPER-FED DRIVING OF LOCK WASHER AND SCREW!

There's an opportunity for real production-time savings in Sems. They're pre-assembled to eliminate handling of separate lock washers and screws on the assembly line . . . can be applied with a hopper-fed screwdriver for extra man-hour economies. Broad selection of types and sizes available. Inquire today.

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THE BLAKE & JOHNSON CO.
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CENTRAL SCREW COMPANY
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CONTINENTAL SCREW CO.
New Bedford, Massachusetts
CRESCENT SCREW PROD. CO.
Rockford, Illinois
ECONOMY SCREW CORP.
Chicago 14, Illinois
ELCO TOOL & SCREW CORP.
Rockford, Illinois
FEDERAL SCREW WORKS
Detroit 10, Michigan
GREAT LAKES SCREW CORP.
Chicago 27, Illinois
H. M. HARPER CO.
Morton Grove, Illinois
HARVEY HUBBELL, INC.
Bridgeport 2, Connecticut
INDIANA METAL PRODUCTS DIVISION, TEXTRON INC.
Rochester, Indiana
KENTUCKY SCREW CO.
Louisville, Kentucky
LAKE ERIE SCREW CORP.
Cleveland 7, Ohio
THE LAMSON & SESSIONS CO.
Cleveland 2, Ohio
MID-AMERICA FASTENERS INC.
Franklin Park, Illinois
MIDLAND SCREW CORP.
Chicago 32, Illinois
NATIONAL LOCK COMPANY
Rockford, Illinois
THE NATIONAL SCREW & MFG. CO.
Cleveland 4, Ohio
Los Angeles 22, California
PARKER-KALON DIVISION, GENERAL AMERICAN TRANSPORTATION CORP.
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PHEOLL MANUFACTURING CO. INC.
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PROGRESSIVE MFG. CO., DIV. OF TORRINGTON CO.
Torrington, Connecticut
RELIANCE DIVISION, EATON MANUFACTURING CO.
Massillon, Ohio
REPUBLIC STEEL CORP.
Bolt & Nut Division, Cleveland 13, Ohio
RING SCREW WORKS
Warren, Michigan
ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois
RUSSELL, BURDSALL & WARD BOLT & NUT CO.
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Los Angeles 33, California
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SCOVILL MANUFACTURING CO.
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SEMS DIVISION, TEXTRON INC.
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SHAKEPROOF/FASTEX DIVISION
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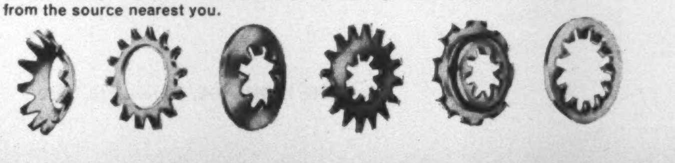
Each Shakeproof Lock Washer is especially designed to insure a firm grip in a specific type of application. They come in a wide variety of styles and sizes—all engineered for mechanical pre-assembly. Save time . . . order from the source nearest you.



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SEMS is a development of
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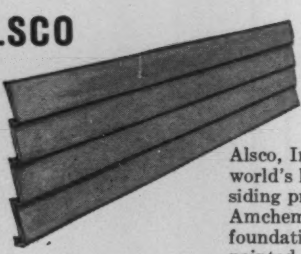
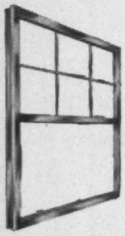


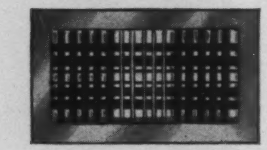
Alsco, Inc., one of the world's leading aluminum siding producers specifies Amchem Alodine® as the foundation for a successfully painted, durable aluminum surface.

GENERAL BRONZE



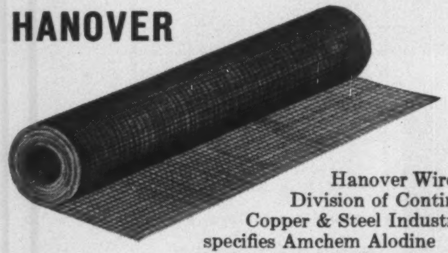
The Alwintite Division of General Bronze Corp. specifies Amchem Alodine and Amchem Aluminum Etchant for a superior, long lasting finish on their popular line of residential aluminum windows.

KRUEGER



Krueger Air Conditioning Corp. specifies Amchem Granodine® for superior pre-paint protection and paint adhesion on steel registers, grilles and diffusers for air conditioning and heating.

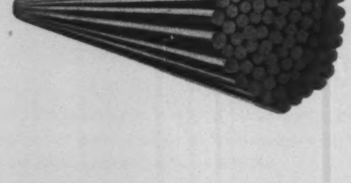
HANOVER



Hanover Wire Cloth Division of Continental Copper & Steel Industries specifies Amchem Alodine as the base for their line of non-glare, corrosion-resistant, color-fast aluminum screening.

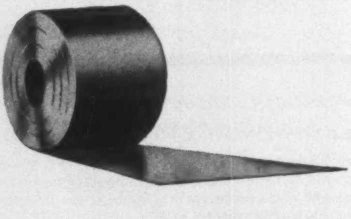
WALLINGFORD STEEL

Wallingford Steel Company, one of the world's largest producers of stainless steel tubing, specifies Amchem Granodraw SS® to facilitate forming of tubing.



CAROLINA METALS

One of the country's top painted aluminum strip processors, Carolina Metal Products Corp., specifies Amchem Alodine for continuous strip pre-paint treatment of aluminum.



AMCHEM for the finest in paint bonding and coating chemicals

BOEING AIRCRAFT

707
Boeing 707

Internationally known Boeing Aircraft Co. specifies Amchem Alodine as a pre-paint treatment, and to treat unpainted portions of the famous 707 jetliner fuselages and engine pods.

If you're looking for superior corrosion resistance, paint bonding and coating performance . . . write for complete information on these and other Amchem chemicals for the metalworking industry.

AMCHEM

Amchem, Alodine, Granodine and Granodraw are registered trademarks of

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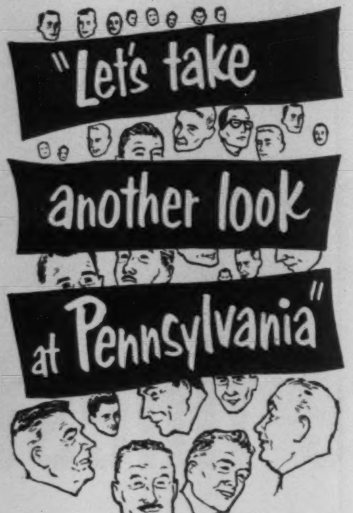

...that's what a growing number of industrial executives are saying and doing!

In the past four years
they announced:

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788 PLANT EXPANSIONS

(Send for the list—address below)

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Surplus of industry-minded workers . . . Strategic locations in the great Eastern market with access to major trunk line railroads, and modern highway and Turnpike networks . . . Ports on the Atlantic, St. Lawrence Seaway and Ohio River system . . . All types of industrial raw materials and components . . . 100% low-interest plant financing in labor surplus areas . . . Choice of industrial "parks" and individual plant sites.

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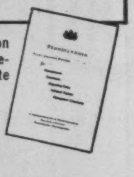


Pennsylvania Department of Commerce
South Office Building
963 State St., Harrisburg, Pa.
Phone: CEdar 4-2912

PATENT REVIEW

New Patents In Metalworking

Ore Pellets

Treating ore concentrates, F. D. De Vaney (assigned to Erie Mining Co., Hibbing, Minn.), Aug. 2, 1960. Balling cone and method for forming iron oxide ore pellets on a specially-prepared rolling surface. A layer of the ore material is built up, and the surface of this layer continuously scraped at a plurality of narrow, separate areas. The scraper members are moved progressively across the entire width of the cone. No. 2,947,026.

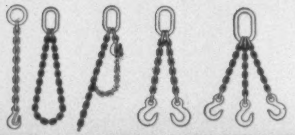
Discharges Pellets

Unloading mechanism for belt conveyors, G. H. Sundin (assigned to U. S. Steel Corp., Pittsburgh), Aug. 23, 1960. In the discharge of iron oxide ore pellets from a belt conveyor, a device is provided for tilting a section of the belt. Tilting the belt discharges the pellets over a side edge at a predetermined point, while preventing material from dropping off immediately above or below that point. No. 2,949,999.

Stands High Stresses

Nickel-free austenitic elevated temperature alloy, R. R. MacFarlane and R. K. Pitler (assigned to Allegheny Ludlum Steel Corp., Brackenridge, Pa.), Aug. 9, 1960. An austenitic nickel-free alloy is capable of withstanding high stresses at temperatures of 1500°F and higher. It consists of 0.2-0.35 pct C, 10-15 pct Mn, up to 0.75 pct Si, 11.5-13.5 pct Cr, 2-3.5 pct Mo, 0.7-1.2 pct V, 0.1-0.3 pct N, 0.01-0.4 pct B, and the remainder substantially all Fe. No. 2,948,604.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.



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the sling chain with everything

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- *maximum safety for overhead lifting*
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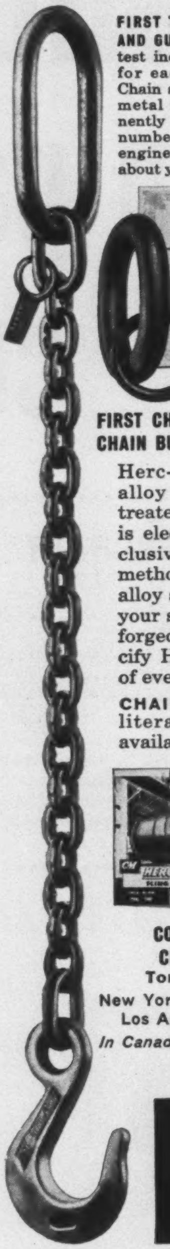
- *long life on toughest jobs*



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FIRST CHOICE WITH EXPERIENCED CHAIN BUYERS SINCE 1933

Herc-Alloy is the original alloy steel chain...is heat treated by a special process...is electrically welded by exclusive Inswell time-tested method. All attachments are alloy steel including those to your specifications which are forged in our own shop. Specify Herc-Alloy for the best of everything in sling chains.

CHAIN SAFETY PROGRAM literature and assistance available.

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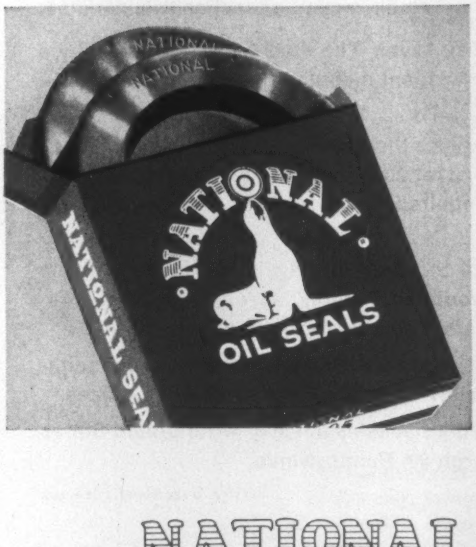
Better products, *faster,* from your National Seal distributor:

Don't take bearing protection for granted... install new National Oil Seals regularly!



Scheduled replacements with these low-cost seals can pay big dividends in low maintenance costs

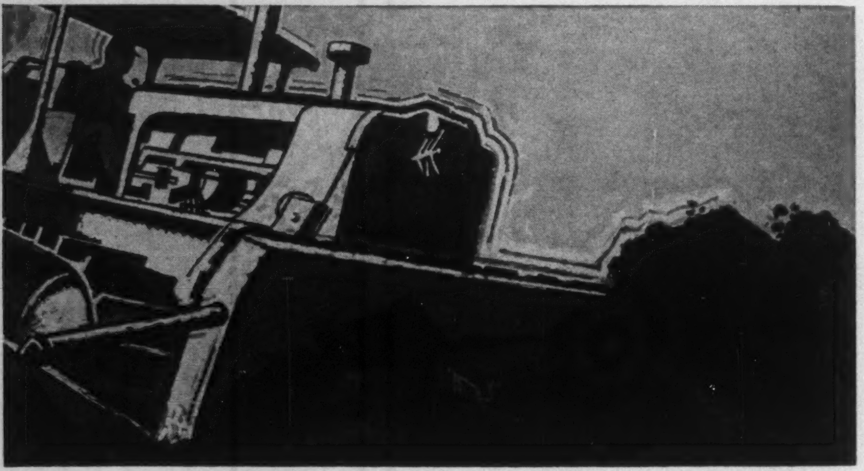
Most shops have discovered the money-saving advantages in replacing old oil seals with new National Seals at regularly scheduled intervals to protect precision machines. National Seals hold in lubrication. They seal out abrasive grit and corrosive elements which damage bearings. *Micro-Torc* leather and *Syntech* synthetic, National exclusives, offer unlimited protection for all applications.

Your National Seal Distributor will gladly work with your organization in setting up a compact working stock. Call him for particulars.

NATIONAL OIL SEALS

FEDERAL-MOGUL SERVICE
DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

Built to take punishment! Steel forgings are widely used on construction equipment because of their ability to withstand impact abuse.



Strength where

Forgings are needed as component parts in the construction of off-highway equipment because they provide strength where strength is needed—to resist repeated heavy impact. What's more, these machines frequently are forced to lift and move loads far heavier than rated capacity. That's why forgings are so widely used for the vital parts. They can take the roughest treatment.

It doesn't pay to have down-time on machines because of a vital part failure. By using forged steel parts, failure in key assemblies can be practically eliminated.

Good forgings require special quality steel. The steel from which forgings are made is specially produced under stringent manufacturing controls to make the steel fit the forging requirement.

Wide variety. United States Steel produces the widest range of quality stainless steels, alloy steels and carbon steels that result in the best possible forged parts. These are produced in all the forms required by the industry and are available in blooms, billets and bars.

Uniform high quality. The quality of the final forging is a reflection of the quality of the steel from which it was produced. For this reason, U. S. Steel carefully controls all processes—from the steel melting to the final inspection.

Metallurgical service. Service Metallurgists are available for prompt consultation on any metallurgical problem in all of U. S. Steel's district sales offices.

For more information, call your nearest district sales office or write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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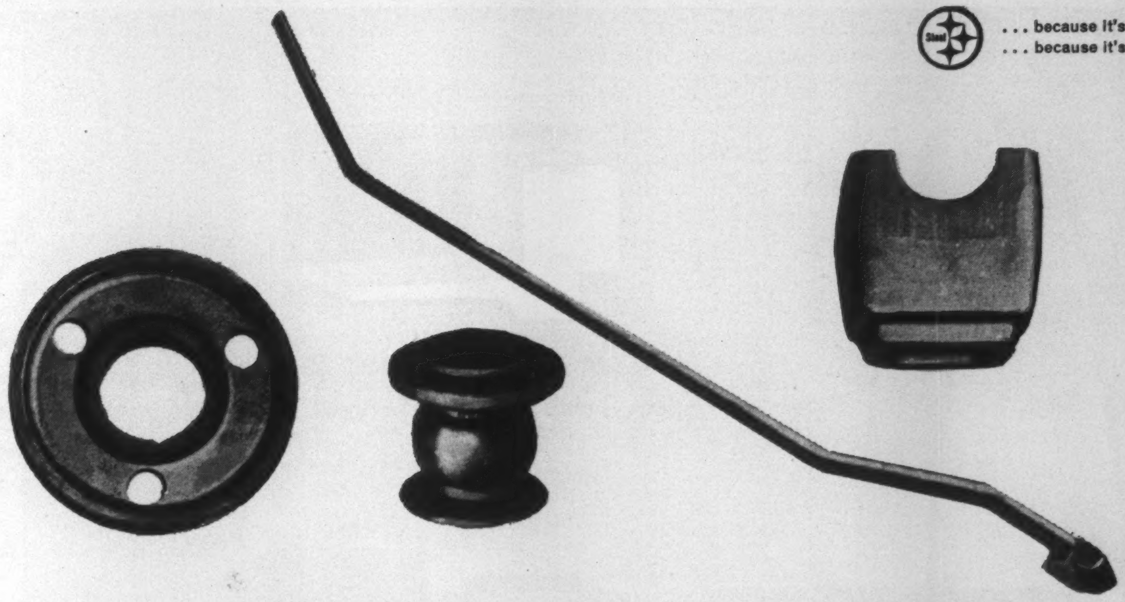
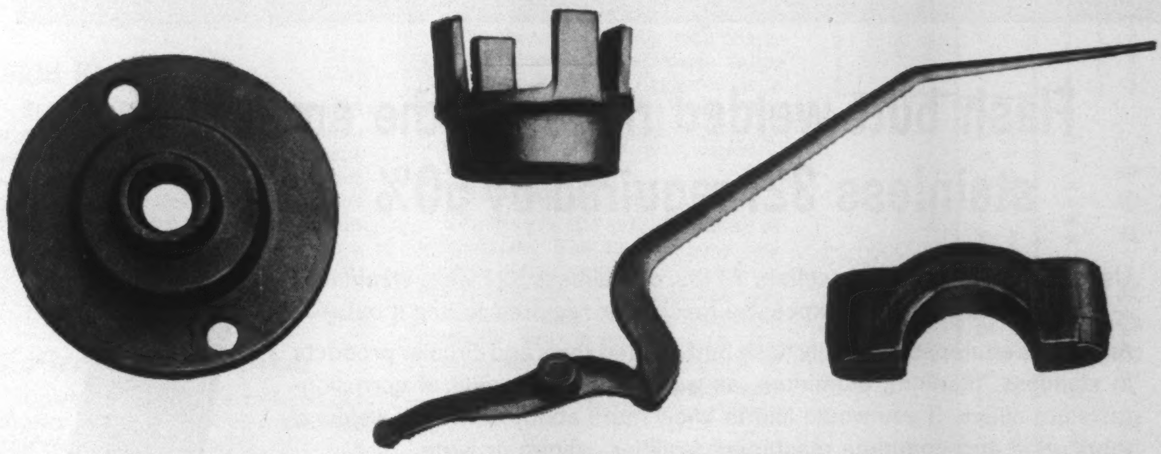
. . . because it's strong
. . . because it's tough



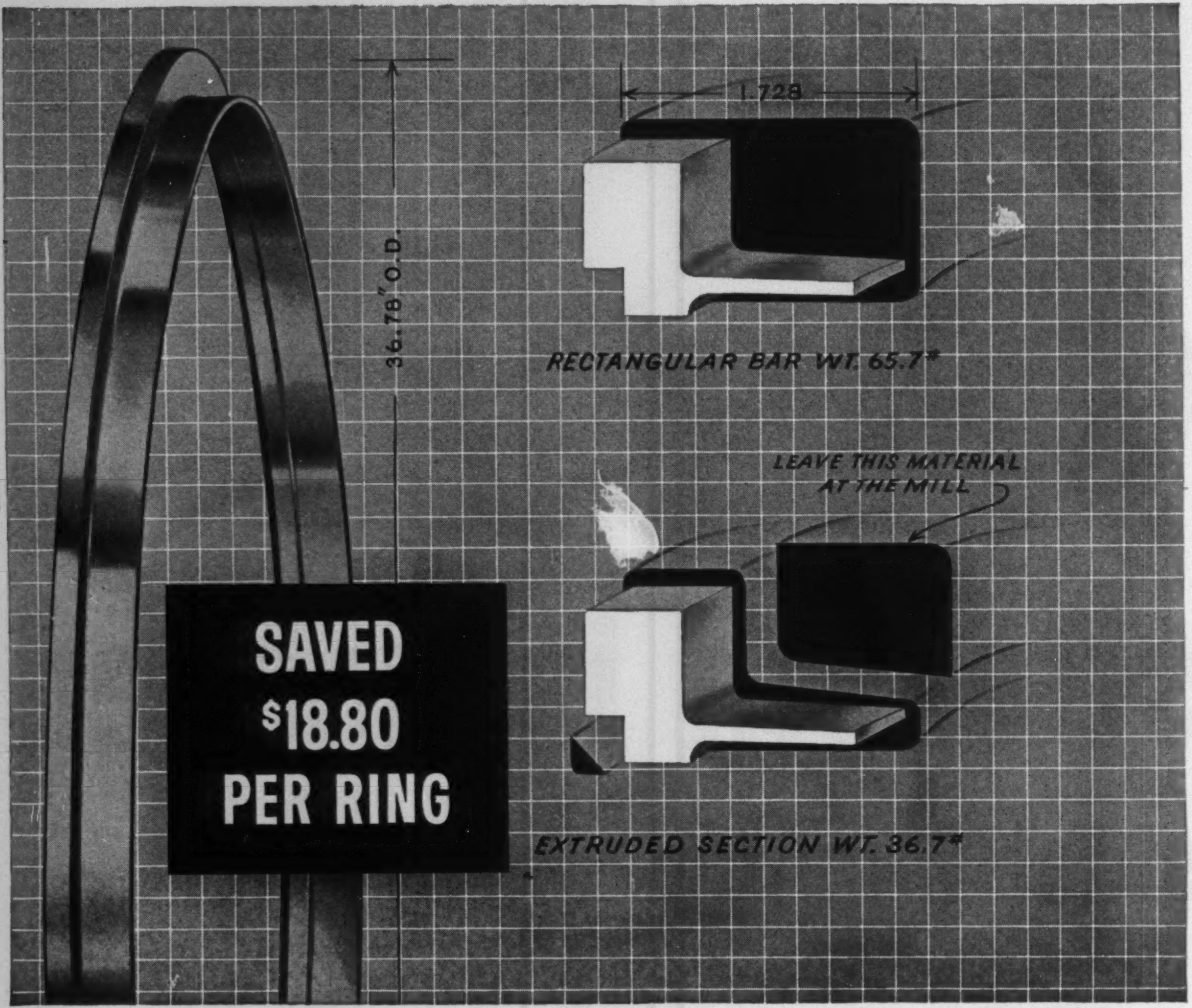
strength is needed

steel forgings provide it!



Advantages of forgings to the manufacturer. Stronger part, lighter weight, greater uniformity, fewer rejects, uniform response to heat treatment, less steel needed, less machining, lower shipping costs and reduced field service costs.

When it's a vital part, forge it from steel. FORGED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36.78" O.D.
RECTANGULAR BAR WT. 65.7#
LEAVE THIS MATERIAL AT THE MILL
SAVED $18.80 PER RING
EXTRUDED SECTION WT. 36.7#

Flash butt-welded rings cut the amount of stainless 321 required by 50%

Using a special extruded section, 29 lbs. of stainless 321 were eliminated —plus the extra hours of expensive machining required to hog it out.

Amweld is equipped to supply flash butt-welded rings and circular products in stainless, titanium, aluminum, as well as a wide variety of corrosion-resistant alloys. If you would like to know more about Amweld's welding, fabricating and complete machining facilities, phone or write.

GET THE FACTS ABOUT AMWELD

New 20-page catalog describes flash butt-welded rings and circular products manufactured by Amweld. Also booklet entitled, "How Flash Butt-Welded Rings are Made."

AMWELD® INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MFG. CO. • 120 DIETZ ROAD • WARREN, OHIO

FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Automatic Lubrication

The three basic elements of automatic lubrication are described and illustrated in a four-page bulletin. Eight types of automatic lubricators are shown. Distribution system details are given. (Bijur Lubricatng Corp.)

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Process Equipment

Equipment for the process industries is described in a comprehensive 12-page, two-color bulletin. The bulletin discusses applications and performance characteristics. Operating principles are explained, and photographs show typical installations. (Fuller Co.)

For free copy circle No. 2 on postcard

Skid Platforms

Skid platforms are described in a short bulletin. It provides comprehensive data on many different skid types in easy to read compact form. The bulletin explains the three basic skid types and offers important design information on a variety of skid features. (Ironbound Box & Lumber Co.)

For free copy circle No. 3 on postcard

Railroad Car Shaker

One-man operated, a railroad car shaker is the subject of a six-page folder. (Link-Belt Co.)

For free copy circle No. 4 on postcard

Mash Seam Welding

Advantages of mash seam welding as a high-speed, high-strength, low-buildup method of coil joining, are described in a catalog. The illustrated six-page publication describes in detail engineering specifications and work range of 11 types of special and standard automatic coil joining welders. (National Electric Welding Machines Co.)

For free copy circle No. 5 on postcard

Stock Dies

Seven hundred stock dies for aluminum extruded shapes, rods and bars, are listed in a 40-page catalog. (General Extrusions Inc.)

For free copy circle No. 6 on postcard

Speed Drives

Electromagnetic drives for conveyors, fans and pumps, winders, metal slitting and forming machines, are reported in a 12-page booklet. The booklet describes how electromagnetic drives work, what they include, and where they are used. (Westinghouse Electric Corp.)

For free copy circle No. 7 on postcard

Circular Saw

Circular-saw, safety-tool literature and a special safety wall chart, are contained in a six-page fully-illustrated booklet. Featured is a safety method to end circular-saw accidents. (Brett-Guard Corp.)

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Crushing

Crushing is the subject matter of a handbook. The 40-page book provides a better understanding of the entire subject of mechanical size reduction. The various reduction methods are described and discussed, as are the many kinds of crushing equipment. (Pennsylvania Crusher Div., Bath Iron Works Corp.)

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Snap-Action Switches

Ideas submitted by plant engineers and electricians, showing how they've used snap-action switches to increase production efficiency, are contained in a bulletin. Illustrated by drawings and photo-

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FREE LITERATURE

graphs, this publication contains five methods which can save man-hours, protect operators and machinery, and eliminate waste. (Micro Switch)

For free copy circle No. 10 on postcard

Heat-Resistant Paint

A 4-page engineering specification bulletin describes an extra-high heat resistant paint. It also reports on its uses, composition, application and storage stability. (Speco, Inc.)

For free copy circle No. 11 on postcard

Solid Film Lubricant

Air-drying, a solid film lubricant is described in a two-page bulletin. The lubricant provides a hard durable solid film lubricant on most types of metallic surfaces. The bulletin also describes application and surface preparation procedures. (Hohman Plating & Mfg. Co.)

For free copy circle No. 12 on postcard

Static Control

Describing a line of static control, an eight-page bulletin pictures and diagrams static control components. The pictures and diagrams show how the components simplify panel design and operation. (General Electric Co.)

For free copy circle No. 13 on postcard

Crane-Excavator

Catalog illustrates and describes a crawler crane-excavator. (American Hoist & Derrick Co.)

For free copy circle No. 14 on postcard

Processing Equipment

Well-illustrated, a 16-page bulletin describes machines for heat treating, selective hardening, brazing and soldering, annealing and other processes for heating metals. The contents outline cost-cutting features designed into machines. (Selas Corp. of America)

For free copy circle No. 15 on postcard

Process Equipment

Highly-illustrated, a four-page bulletin gives a complete rundown of standard and specially-engineered heat transfer and process equipment. Described are fully standardized lines of storage water heaters, instantaneous heaters, and hot water converters; plus specially-engineered heat-transfer and process equipment. (Niagara Weldments, Inc.)

For free copy circle No. 16 on postcard

Feeder Valves

Complete information, on a line of heavy-duty, pressure-tight, rotary vane feeder valves, is given in a bulletin. (Sprout-Waldron & Co., Inc.)

For free copy circle No. 17 on postcard

Die Steel

Characteristics and typical applications of a chromium-molybdenum-vanadium alloy die steel for hot forging applications, are contained in a data sheet. Instructions for forging, annealing, hardening, and tempering are given. (Heppenstall Co.)

For free copy circle No. 18 on postcard

Compressors

The operating characteristics of 4000-hp compressors are described in a four-page brochure. The booklet also describes controls which can make the compressor unit into a completely automatic system which starts itself, shuts itself down, or operates fully unloaded. (The Cooper-Bessemer Corp.)

For free copy circle No. 19 on postcard

Brushing Tools

Industrially-engineered brushing tools is the subject matter of a 16-page promotional brochure. The literature demonstrates to manufacturers the versatility and adaptability of engineered brushing tools for many industrial operations. (American Brush Manufacturers Assoc.)

For free copy circle No. 20 on postcard

Square-Head Cylinder

Describing a high-pressure square head cylinder, a bulletin offers general and technical information. It also gives model and mounting dimensions and specifications for the interchangeable high-pressure cylinder. (The Tomkins-Johnson Co.)

For free copy circle No. 21 on postcard

Fasteners

Information on fasteners and screw machine products fill the eight pages of a brochure. The brochure also gives thread sizes and lengths. Special items made to order are also listed. (Aluminum Co. of America)

For free copy circle No. 22 on postcard

TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • Johnston cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

With slabbers, the cooler the rolls, the longer they last

We have been somewhat concerned during the last year or so by what seems to us a more than normal number of premature roll failures in universal slabbing mills. These failures have not been limited to any one brand of rolls.

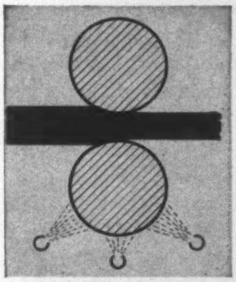
As a result, we have been checking among the many users of universal slabbers of our acquaintance, and in particular, with the operators whose mills have been giving them good outputs between roll replacements.

We think we have the answer to part of the problem, and will pass it along to you. Even if you don't operate a slabbing mill, you may find it helpful in connection with hot mill operation in general.

Not enough water. In every troublesome case that has come to our attention, too little cooling water was reaching the bottom roll, either because of an inadequate cooling system, or clogging of the spray header. Here is the way two steel plants are currently taking care of the problem:

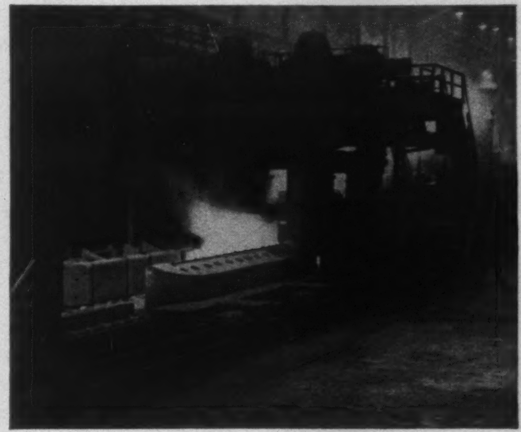
CASE A: Water is applied to the top roll by means of a water box, with wipers on both entry and delivery sides. Three 4-inch pipes spray the bottom roll, one directly beneath the roll and the other two on the entry and delivery sides. When this mill was first installed, it had only one pipe directly beneath the bottom roll, which resulted in frequent roll breakage.

This mill is particularly careful about bringing the rolls up to working heat before beginning production. Standard practice is to pass two ingots three or four times through the mill, taking very mild reductions, with the water valves opened only half way. The two "start-up" ingots are then sent back to the soaking pit, the water is turned up to full pressure and a new, hot ingot is brought up to start the turn's regular production run.



Good blooming and slabbing mill roll-cooling arrangement utilizes two or more water lines to the bottom roll, which is usually the first to show signs of premature failure.

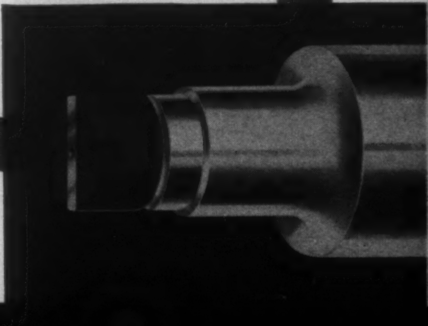
CASE B: This mill as delivered had only one spray header underneath the bottom roll. Bad fire cracking and roll breakage occurred almost from the day the mill was placed in production. Study of the mill showed that scale was lodging between the water pipe and the bottom roll, so that little if any cooling water was reaching the roll. Two additional water lines were brought in, each delivering its water about half way up the side of the roll. The general problem has been effectively solved by this expedient. Today, this mill at times rolls up to 140,000 tons before the rolls are redressed although normal practice is to change rolls after approximately 75,000 tons.



This is the mill described in Case A; it has an excellent record, thanks to careful control of heat in the rolls and the avoidance of sudden temperature changes.

Mack-Hemp has evolved a number of roll analyses that are especially good for slabbing and blooming work because of their combination of strength and resistance to fire cracking. Mack-Hemp *Technalloy* rolls cast from chrome-moly steel and specially heat treated offer excellent resistance to fire cracking and breakage under the most severe operating conditions. Mack-Hemp *Superalloy,* a nickel-chromium-molybdenum steel roll, turns in outstanding performance in blooming mills where side wear and fire cracking in the passes has been severe.

Whatever your problem of roll use, you'll find that Mack-Hemp can provide useful advice or helpful suggestions. We've been accumulating data on roll performance for more than a century and a quarter . . . it's yours for the asking. 'Phone or write us at any time.

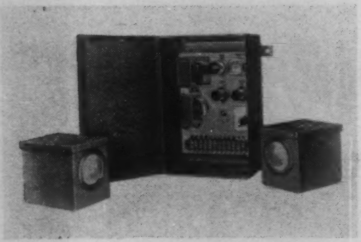


MACKINTOSH-HEMPHILL

You get more tonnage from the rolls with the Striped Red Wabblers

Division of E. W. BLISS COMPANY
Presses, Rolling Mills, Special Machinery

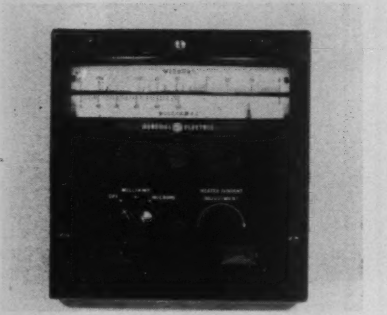
New Materials and Components



Electronic Die Protectors Prevent Die Damage

For punch presses, a line of electronic die protectors prevents die damage due to double heading. The device allows the press to recycle only if a part is ejected from the previous cycle. The device can also be used to count parts. The electronic protectors are for any size automatic or manually-fed press. They can be used with any type of electrically-operated clutch. (The Clark Controller Co.)

For more data circle No. 23 on postcard, p. 105



Indicator-Controller Offers Close Indication

Adaptable to close-tolerance control systems, a thermocouple-vacuum-gage indicator - controller initiates control on either increases or decreases in pressures. Control point is adjustable over the entire calibration range, which is 1 to 1000 microns. The controller portion of the instrument employs a small metal vane on the pointer. The metal vane passes between a pair of sensing coils when the pointer reaches the setpoint. This activates an oscillating circuit which in turn de-energizes the controller relay. This system offers good indication and control tolerances around the setpoint. (General Electric Co.)

For more data circle No. 24 on postcard, p. 105

Transmission Provides Unusual Control Flexibility

Shaft-mounted, a rotating transmission concentrically mounts on a machine's driven shaft. The transmission operates the machine at a reduced speed from that of the drive motor. The entire transmission is contained completely within the outer surface. The outer surface is machined for V-belt drive from the motor. The transmission also provides high torque capacity at any reduction and high overload capacity. The transmission comes in capacities from fractional through 60 hp, for torque ratings through 21,850 lb-ft. The transmission finds use in the metalworking, mining, and materials-handling industries. (Airborne Accessories Corp.)

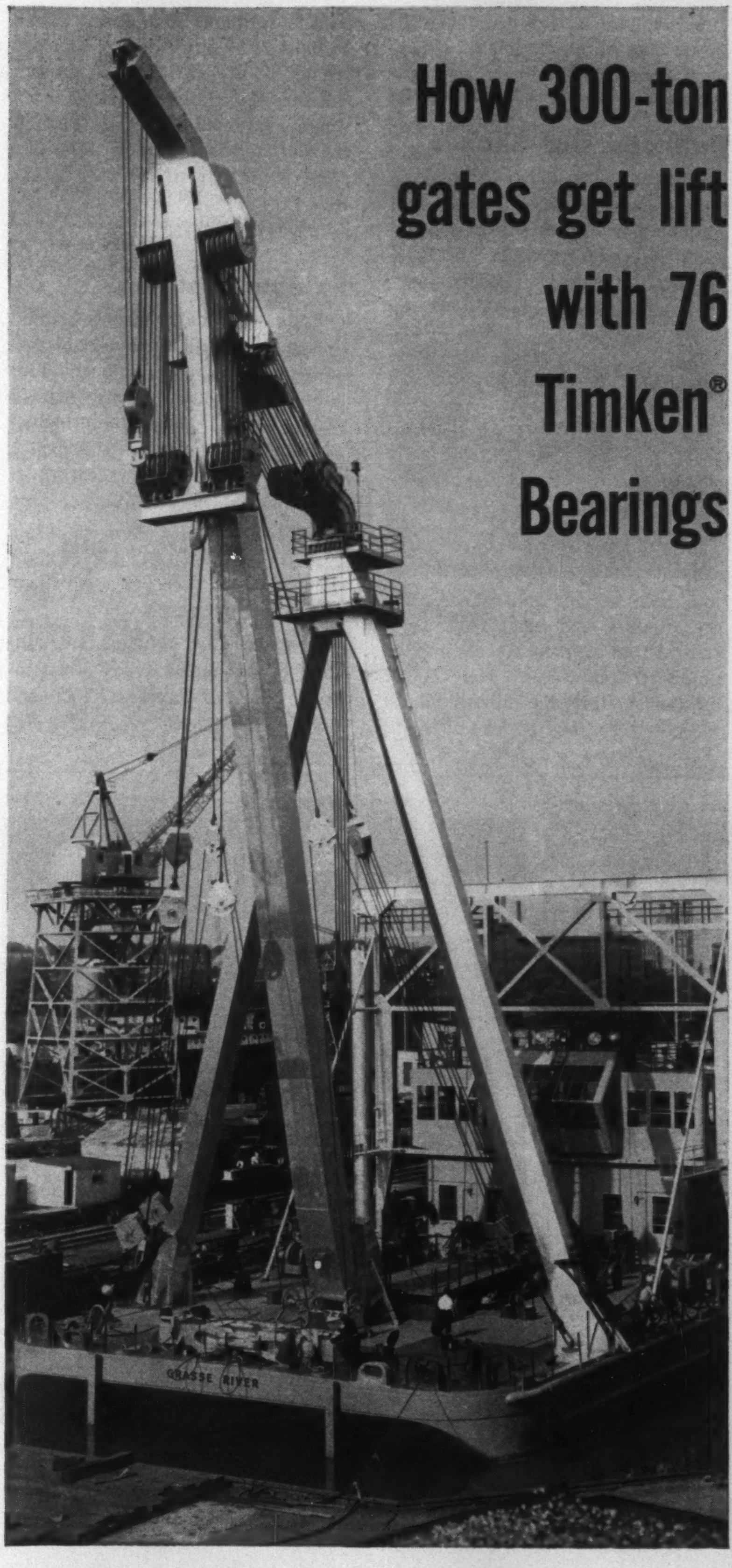
For more data circle No. 25 on postcard, p. 105

autobend
general automation corp.

Device Gives Push-Button Control on Press Brakes

Automatically eliminating whipping, a push-button control insures uniform bending. It automatically cycles the brake and provides the correct bending speed. The device provides push-button programming for every type of production and custom work. Stepless speed control, from a small fraction to 100 pct, permits peaking to the maximum bending speed that the work will allow. Installation requires no major changes on any press brake. It attaches to any size and model brake. It does not require a skilled operator to run it. An operator merely steps on the electric foot pedal and follows the work up—all in one easy motion. The control eliminates operator guesswork on production runs. It also increases accuracy on custom work. (General Automation Corp.)

For more data circle No. 26 on postcard, p. 105



How 300-ton gates get lift with 76 Timken® Bearings

Here's a lift job to make your eyes pop. This gate lifter barge hoists the St. Lawrence Seaway's 300-ton lock gates for maintenance work. Strain is great on the 72 hoisting sheaves. To take it, McKissick Products Co. of Tulsa, Okla., the sheave builders, mounted them on Timken® tapered roller bearings. Sheaves were installed by the American Ship Building Co. of Cleveland, O. And a Timken bearing is used in the main hook thrust position to support the entire 300-ton load. Timken bearings are also used in the derrick head-Rooster.

The tapered design of Timken bearings lets them take all the loads, *both* radial *and* thrust. Maximum sheave rigidity and accurate sheave alignment are provided by the TDO type sheave bearings with their built-in, large, effective bearing spread distances. And because of Timken bearings' true rolling motion, sheaves turn easily, dependably, even under heavy overloads.

SERVICE THAT SAVES YOU TIME AND MONEY. Our graduate engineer salesmen can solve your bearing problems on the spot—right at the design stage.

The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO." Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ont.

Industry rolls on

TIMKEN®

tapered roller bearings

Slitting Knives

Carbide slitting knives hold their cutting edges 10 to 15 times longer, between re-grindings, than conventional high-alloy slitting knives. They are ideally suited for side trimming and gang slitting light gages of high- and low-carbon steel, silicon, tinplate stock, aluminum, brass, copper and other light gage materials. (Cowles Tool Co.)

For more data circle No. 27 on postcard, p. 105

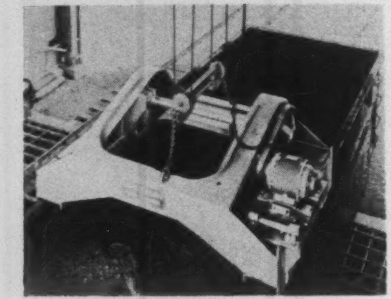
Flat Nylon Washer

A flat nylon washer is ideal for use as a spacer or as an insulator. It can be used on any screw, bolt, pin, nail or rivet. Because of the low coefficient of friction of nylon against metals, these washers provide inexpensive bearings that require no lubrication. The washers can also be used to prevent corrosion. The nylon insulates dissimilar metals. The natural resilience of nylon enables the washer to absorb shock and vibration. (Nyltite Corp. of America.)

For more data circle No. 28 on postcard, p. 105

Railroad Car Shaker

One-man-operated, a railroad car shaker incorporates a new low-frequency vibration shaker mechanism design. It provides fast, economical unloading of hopper bottom cars carrying coal, sand, coke, ore, cinders, and other bulk materials. From eight to 10 cars may be unloaded per hour. The shaker mechanism transmits low-frequency vibrations to the top of car sides, parallel to the horizontal axis of the car and in the direction of maximum strength. Lengthwise shaking action is produced by two unbalanced weights mounted on a shaft. The car shaker can be mounted anywhere along the length of the car. (Link-Belt Co.)



For more data circle No. 29 on postcard, p. 105

Folding Column

Power-operated, a folding column rolls in or out to form a rigid column. It is capable of pushing or pulling heavy loads linearly with a steady force. One of its principal advantages is that when rolled in it occupies only a tiny percentage of its extended size. (Wayne Iron Works)

For more data circle No. 30 on postcard, p. 105

Line Strainers

Magnetic line strainers are suitable for use on all types of equipment. Such equipment includes: mining equipment, machinery lu-

WHEELABRATOR

EXECUTIVE REPORT #29

BETTER SURFACE PREPARATION

...Wheelabrator® does an eight hour job in eight minutes!

Better surface condition than was achieved in 8-hour wet tumbling cycles is now accomplished in just eight minutes in a Wheelabrator Super Tumblast at Landers, Frary & Clark, in preparation of food chopper parts for tinning. Space requirements were reduced three-fourths with the elimination of the 30 wet tumbling mills. One man does work that formerly required three. Breakage has been reduced sufficiently to eliminate one inspection. "The Super Tumblast modernized a practically primitive operation", according to the Landers, Frary & Clark foundry superintendent.

Modernizing with Wheelabrator airless blast equipment can save you time and money, and result in a superior product as well. It costs nothing to have a Wheelabrator engineer give you all the facts. Write to Wheelabrator Corp., 510 S. Byrkit Street, Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ontario.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

brication systems and oil filtration equipment. They can also be quickly adapted for existing systems where sump strainers cannot be used. Concentrated two-way filtration comes from powerful, built-in circular Alnico magnets. The magnets are placed between removable filter disk screens at specific intervals. (Ripley Screen & Strainer Co.)

For more data circle No. 31 on postcard, p. 105

Fastening Device

Capable of holding two pipes or tubes of different diameters firmly together at right angles, a tube clamp adjusts to the pipe diameter in any given application. The clamp requires only one manual adjustment to grasp two tubes or pipes and grip both tightly together at right angles. (Hunter Spring Co.)

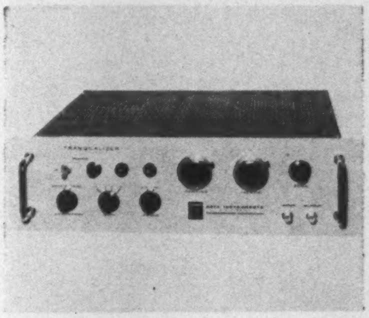
For more data circle No. 32 on postcard, p. 105

Pillow Block Unit

A pillow block unit incorporates high-quality bearings. Sturdy, economical pressed steel housings provide a precision bearing-to-housing fit and a true self-aligning bearing. The unit accommodates shaft sizes between ½ and 1-7/16 in. It is suitable for most pillow block bearing applications. (The Fafnir Bearing Co.)

For more data circle No. 33 on postcard, p. 105

Transducer Equalizer



Simplifying data recording, a tranducer equalizer provides a method to receive and observe in real time. It also provides a method to accurately record analog data otherwise masked and destroyed by the limitations of the measuring system. It effectively extends the system's frequency response by several octaves. The unit performs by inserting into the data a complex transducer function which is the reciprocal of the transducer transfer function. It is designed for on-line use. (Telecomputing Corp.)

For more data circle No. 34 on postcard, p. 105

Welding Torch

For use in tungsten inert gas, arc-welding, a controlled-angle welding torch features a flexible body. The body can be readily hand-adjusted to any angle; also, extended to reach into difficult recesses. (Falstrom Co.)

For more data circle No. 35 on postcard, p. 105

Pneumatic Die Cushions

Forty-eight inch pneumatic die cushions develop an overall ring holding pressure of 180 tons, from the average standard shop air line. These new designs are of all steel weldment construction with bearing

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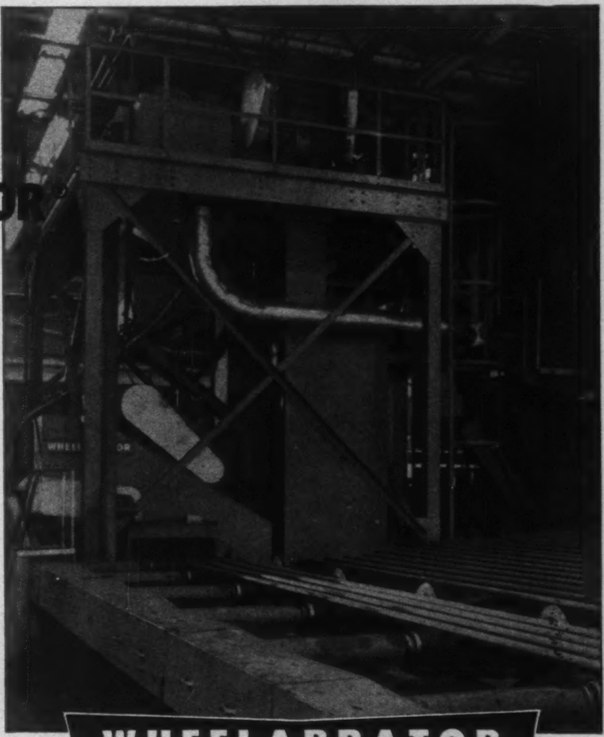


EXECUTIVE REPORT #30

AUTOMATED DESCALING WITH THE WHEELABRATOR®

The bar stock cleaning line in the new two million dollar Elyria, Ohio, Cold Draw plant of The Western Automatic Machine Screw Co., Div. of Standard Screw Co. utilizes one of six Wheelabrator descaling machines that have completely eliminated pickling in this modern plant.

On the bar line, the Wheelabrator enables one man to handle the entire operation, from receipt of bar bundles, through an unscrambler, transfer to feed roll conveyors, through the Wheelabrator, and out onto a storage rack in line with the draw bench. For over 16 months of operation, round, square and hex bar stock, up to 4½" diameter in 15' to 45' lengths, has been descaled without any of the old acid pickling headaches. In addition, Western Automatic reports that Wheelabrator descaling provides a definitely superior product for subsequent cold drawing.

How To Automate Your Bar and Wire Drawing Lines

Details of Wheelabrator's cost-saving descaling method are illustrated in Bulletin 148-D. Write to Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Indiana. In Canada, P.O. Box 490, Scarborough, Ontario.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

What Would

75% PAINT SAVINGS

Mean in YOUR Finishing Department?

Designed for the New Decade—Beautifully styled BAL HARBOUR line of aluminum furniture by AFCO was winner of the 1960 Apollo Award for pre-eminence in design. The uniform, high quality finish is applied electrostatically with the Ransburg No. 2 Process Hand Gun.

Faster . . . Cleaner . . . Cheaper—The "wrap-around" feature of the No. 2 Process Electrostatic Hand Gun paints all areas of this type of work from one side only, providing a 75% paint savings and a 700% increase in production volume over former air hand spray.

RANSBURG

Ransburg No. 2 Process Electrostatic Hand Guns are providing a 75% paint savings in the painting of beautiful AFCO aluminum furniture.

AFCO Aluminum Furniture Co., Inc., Miami, Fla., replaced hand spray with two Ransburg Electrostatic Hand Guns. Along with paint and labor savings, quality of the work was improved with greater uniformity. And, production volume was increased a healthy 700%! Formerly, they were painting approximately 100 items a day. NOW, with the faster, cleaner Electrostatic Hand Guns, they paint from 700 to 800 pieces per day. Electrostatic is faster because the "wrap-around" characteristic of Electro-Spray paints all areas of this type of work with a pass from one side only.

NO REASON WHY YOU CAN'T DO IT TOO

Write for information and literature about this revolutionary, new painting tool. See how the Ransburg Electrostatic Hand Gun can save time . . . paint . . . and cut costs in YOUR finishing department. If your production justifies, it'll pay you to investigate Ransburg's *automatic* electrostatic spray painting equipment. Write for our No. 2 Process brochures which show numerous examples of modern production painting in both large and small plants.

RANSBURG Electro-Coating Corp.
Box 23122, Indianapolis 23, Indiana

bronze overlay, including a centralized lubricating system. They can be provided with or without hardened and ground pin pressure pads or wear plates, together with adjustable features, making these larger sizes a full universal installation on any of the larger power presses. (Dayton Rogers Mfg. Co.)

For more data circle No. 36 on postcard, p. 105

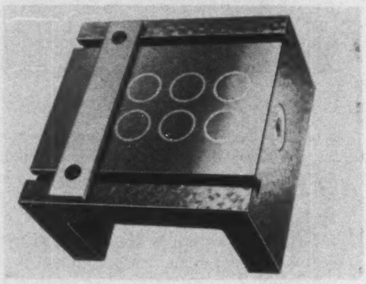
Gravity Feeder

For applications requiring a high degree of accuracy in the feeding and batching of free flowing nonflooding materials, a two speed feeder employs a feature which prevents clogging during the slow feed process. At fast speed, the flow control gate is adjusted to its fully-opened position. This permits unrestricted material flow. (Thayer Scale Corp.)

For more data circle No. 37 on postcard, p. 105

Magnetic Angle Plate

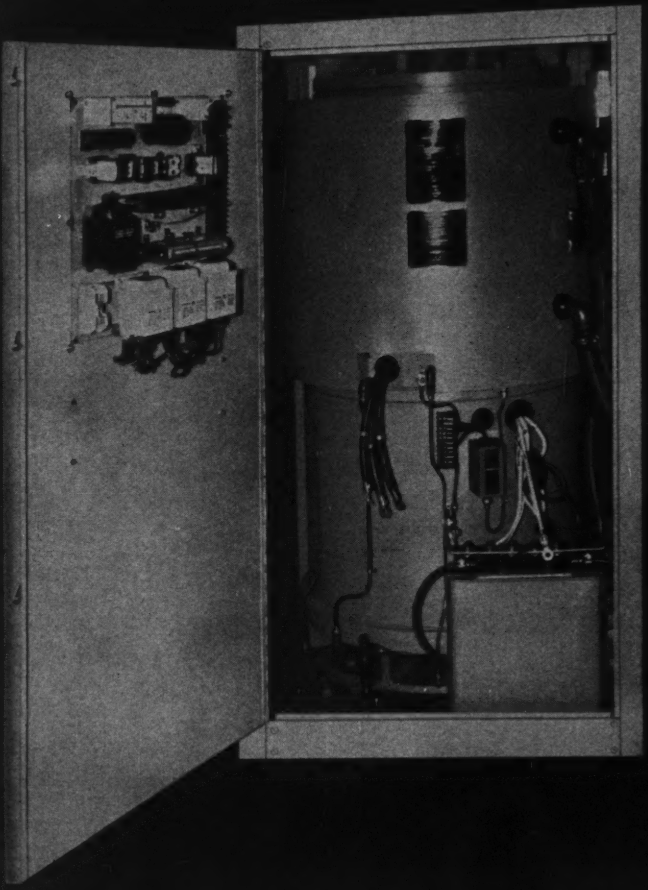
Inspection and layout of any ferrous metal is possible on a magnetic angle plate, without use of clamps. Dimensions of the angle plate are 6 x 6 x 4 in. The plate is guaranteed to be square within 0.0002 in. An adjustable guide rail, supported in two T-slots, may be used as a reference or support and can be removed completely. The permanent magnetic chuck, which does not create magnetic distortion, is activated by a key. (Bald Eagle Products Co.)



For more data circle No. 38 on postcard, p. 105

Burnishing Compound

Designed for burnishing zinc, aluminum, steel and other metals, a new compound, works well on all



- FORCED OIL LUBRICATION of the upper and lower bearings gives twice the normal expected bearing life.
- ALL AUXILIARY COMPONENTS are safely contained and mounted within the heavy gauge steel enclosure.
- EASY ACCESS for servicing or inspection without disassembly of cabinet or shroud.
- SINGLE OVERSIZED AREA water to air heat exchanger provides cooling.
- SPECIAL ROTOR LOCKING DEVICE prevents brinelling of bearings during shipment.
- FULL COMPLEMENT OF PROTECTIVE DEVICES including an annunciator panel.

The AM Motor Generator Unit is a proven Vertical Design with new features to improve service life and maintenance.

MAGNETHERMIC

AJAX ELECTROTHERMIC

AJAX ENGINEERING

AJAX MAGNETHERMIC

WATCH AM

FOR THE NEW IDEAS IN THE HEATING AND MELTING OF METALS BY INDUCTION

HIGH FREQUENCY MOTOR GENERATOR SETS

Another of the many products of AM for the heating and melting of metals by induction.

"induction heating is our only business"

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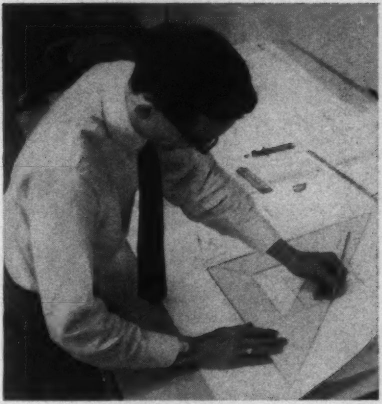
Ajax, Ontario

FROM **CRUCIBLE** LOCAL STEEL CENTERS*

KEY MEN AT CRUCIBLE LOCAL STEEL CENTERS — the inside account salesman, sales-service engineer, and field metallurgist — help surmount problems of purchasing, metalworking and materials selection.

CUTTING LOW ALLOY PLATE BY FLAME is performed at major Crucible steel centers. At others, flame-cutting to your specs is easily arranged.



CRUCIBLE ACCOMMODATION SERVICES can help you by arranging for "extras" such as slitting, forging, buffing, polishing — whatever you need.

INVENTORY CONTROLLERS MAINTAIN HIGH STOCK LEVELS to meet customers' maximum needs. Average Crucible steel center stocks 16,000 specialty steel items.

SPECIALIZED SKILLS

Specialists at integrated Crucible steel centers perform vital services for your buyers, engineers and production personnel.

A wide range of problems is surmounted daily with the help of local Crucible specialists. For example:

The inside account salesmen continually help buyers simplify purchasing details. They know the steels their customers use, the quantities needed and processing requirements. They make buying specialty steels easier and more economical for you.

Sales-service engineers help production personnel cut through fabrication problems. Their experience in both steelmaking and metalworking makes specialty steels easier to use. Most Crucible steel centers are staffed by specialists in alloy steels, stainless, tool steels.

Field metallurgists work with customers' engineers on materials evaluation and selection. They can give you unbiased recommendations on metals for almost any job or part. And you get immediate assistance because there's a field metallurgist located in every region.

Behind these men are other Crucible specialists— inventory controllers, draftsmen, saw men, warehousemen, teletype operators — whose skills also make specialty steels more economical for you. Combined, they offer you a local steel service that is unusual because of its depth. *Crucible Steel Company of America, Department PJ06, Pittsburgh 30, Pennsylvania.*

CRUCIBLE
ALLOY STOCK LIST

MONTHLY STOCK LIST gives you up-to-date news on local stocks of specialty steels. Ask the Crucible salesman to put your name on the mailing list.

***FROM CRUCIBLE LOCAL STEEL CENTERS:** TOOL STEELS — Water, oil, air hardening, shock resisting, hot work, plastic and die casting steels in all forms, including bars, sheets, plates, drill rod, hollow bars, forgings and flat ground stocks • HIGH SPEED STEELS — Crucible's famous "Rex"® steels: Rex Thrift Finish rounds, hot rolled and cold drawn flats and squares, drill rod, forgings, sheets, plates, and tool bits • STAINLESS STEELS — Bars, sheet, strip, wire, cold heading wire, metalizing wire, plates, angles • FREE MACHINING STEELS — Crucible Max-el® rounds, hexagons, plates and brake die steel • ALLOY STEELS — Bars, billets, strip and sheet • COLD ROLLED CARBON SPRING STEELS • DRILL STEELS — Hollow and solid drill steels • ALUMINUM EXTRUSION DIE STEELS • HOLLOW TOOL STEEL • HARD FACING ROD • PLASTIC MOLD STEELS • PERMANENT MAGNETS • and many others.

CRUCIBLE STEEL COMPANY OF AMERICA

BRANCH OFFICES AND STEEL CENTERS: Atlanta • Baltimore • Boston • Buffalo • Caldwell, N.J. • Charlotte • Chicago • Cincinnati • Cleveland • Columbus • Dallas • Dayton Denver • Detroit • Erie, Pa. • Grand Rapids • Houston • Indianapolis • Los Angeles • Miami • Milwaukee • Minneapolis • New Haven • New York • Philadelphia Pittsburgh • Portland, Ore. • Providence • Rockford • Salt Lake City • San Francisco • Seattle • Springfield, Mass. • St. Louis • E. Syracuse • Tampa • Toledo • Tulsa

UNIFORMITY
ECONOMY
VOTE KEOKUK
K.
KEMCO KUTS KOSTS

Here's a kampaign promise you KAN believe

*"Fellow foundrymen and steel men, you all know me, Chief Keokuk. I'm running on the Kemco ticket . . . and I promise you that a vote for Kemco Silvery, the superior form of silicon introduction, is a vote for quality and economy. The record speaks for itself, my friends, so when you vote for Silicon . . . vote for KEMCO!"**

KEMCO SILVERY PIG IRON

SILICON METAL—OTHER FERROALLOYS

Kemco Silvery melts smoothly, uniformly every time and it's economical to use. Choose 60 lb. or 30 lb. pigs or 12½ lb. piglets in regular or alloy analysis for iron and steel production. For complete information, send for free booklet, "For Lower Costs, Higher Quality Products." Be sure to check the performance of Kemco Silicon Metal in aluminum, too.

K
TAKE A TRIP

Keokuk Electro-Metals CO.
Division of Vanadium Corporation of America
Keokuk, Iowa • Wenatchee, Washington

Sales Agent: Miller and Company
332 S. Michigan Avenue, Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

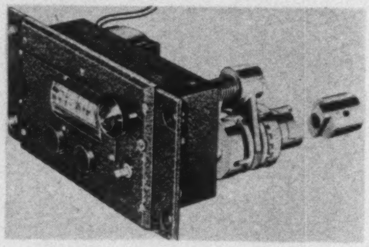
**Wear a Chief Keokuk campaign button! Write Campaign Managers Princess Wenatchee and Junior at Keokuk for your button . . . a supply if you wish.*

metals except magnesium. It is mildly acidic and produces brilliant blue-white color on zinc die-castings. It often eliminates the need for the bright dip operation on metals which develop oxide films. The compound will not leave a film to hinder plating. (Oakite Products, Inc.)

For more data circle No. 39 on postcard, p. 105

Digital Indicator

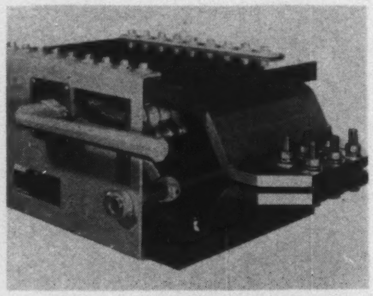
Panel mounted, a ruggedly-built, high-speed digital position indicator has built-in illumination of the dial. It is designed to be used for the indication of roll spacing on steel or brass rolling machinery; tool position on machine tools; as well as on the other heavy machinery usually located in poorly lit areas. The unit can count at rates of up to 15,000 counts per minute with the standard 10:1 ratio. (Durant Mfg. Co.)

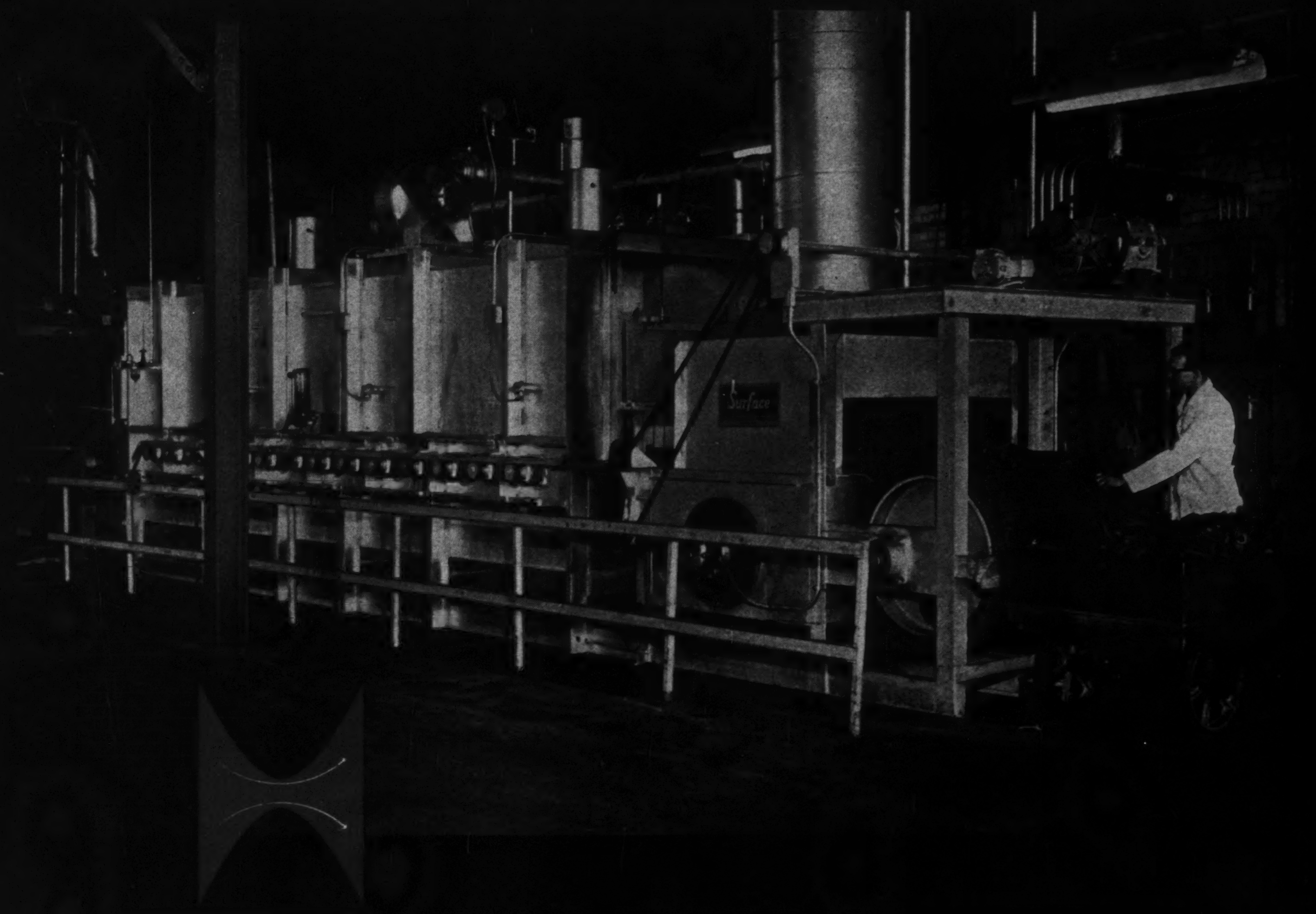


For more data circle No. 40 on postcard, p. 105

Disconnect Switch

For steel mill and heavy industrial use, a low-voltage, high-current disconnect switch is suitable for 750-v operation. The copper "wedge" type switch comes in a standard 5000-amp unit or, in multiples of 5000 amp for use in gang operated appli-





SURFACE POWER CONVECTION EQUIPMENT

cuts Ross Gear forging process time 50%

High speed, high volume air circulation is the feature of this Surface continuous draw furnace, which enabled Ross Gear and Tool Company, Lafayette, Indiana, to

(1) process a wide variety of steering gear forgings much faster than with the batch type furnaces replaced. These forgings range from a few ounces to 22 pounds.

(2) draw forgings at rates to keep up with production in hardening operations.

(3) reduce handling operations, consequently reassign personnel to more productive jobs.

The furnace has three separately controlled zones, each with its own burners and fan. The uniformity of furnace temperature from zone to zone is consistently held within ±5°F.

Mr. Leonard Ewalt, Chief Metallurgist of Ross Gear, reports: "The furnace will heat through a 2-inch section in approximately 40 minutes—just about as fast as the metal can take it when heated by convection . . . I would say that with this method of distributing heat in the zones and the rapid heating rate, this Power Convection furnace* is a couple of years ahead of its time.

We're not waiting for tomorrow, either. We're getting results today."

Write for bulletin SC-182. Surface Combustion, 2373 Dorr Street, Toledo 1, Ohio. In Canada: Surface Industrial Furnaces Ltd., Toronto, Ont.

*Trademark of Surface Combustion, Division of Midland-Ross Corp.

Surface *A division of Midland-Ross Corporation* M-R cations. Self-aligning hard-drawn copper contact wedges offer good wiping action, both closing and opening. (H. K. Porter Co., Inc.)

For more data circle No. 41 on postcard, p. 105

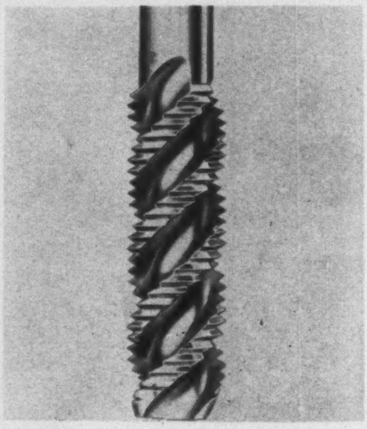
Splice Cap and Tool

Pre-insulated splice caps and a ratchet - controlled tool crimp through the Nylon insulation without weakening its insulating qualities. This permits manufacturers of electrical equipment to pigtail splice a wide range of wire sizes with one size cap and one size tool. Tough see-through nylon permits easy inspection. (Buchanan Electrical Products Corp.)

For more data circle No. 42 on postcard, p. 105

Taps Modern Metals

Designed for precision tapping of the newly developed "difficult to machine" materials. A line of taps features efficient removal of chips. The taps eliminate broken taps caused by clogged flutes. The new taps make smooth, accurate threads to the most exacting tolerance. (Morse Twist Drill & Machine Co.)



For more data circle No. 43 on postcard, p. 105

Machining Concentrate

Tube finning, tube roll forming and broaching run cooler and cleaner with a new water soluble machining concentrate. The compound offers the optimum in cooling ability, cleanliness and low cost for aluminum, brasses, cupronickels, carbon steel and stainless steel. It need not be removed to perform brazing operations. The compound may be used with all types of filtering systems. (Baker/Gubbins Co.)

For more data circle No. 44 on postcard, p. 105

Live Roller Conveyor

Chain driven, a live roller conveyor has a forward thrust proportional to the weight of the load. It transports loads that can be stopped at any point without stopping the conveyor, even on a powered curve. The conveyor permits loads to accumulate and assemble for long periods of time without wear on the rollers. (Harry J. Ferguson Co.)

For more data circle No. 45 on postcard, p. 105

Abrasive Cleaner

A new blast cleaning abrasive occupies a position between present malleable abrasives and steel, both

NEW MILLER CONSTANT POTENTIAL D-C WELDER **CP-3-VS**

X-ray perfect MIG welds on aluminum, magnesium, stainless and carbon steel sheets down to .030" are the routine result with the New Miller Constant Potential, CP-3-VS. Continuous slope and voltage adjustment even during the course of the weld means that the operator is able to "tune in" the desired settings. There's no burn-through; there's no spatter. Actually, a new performance high in low voltage welding is established with the introduction of this welder with its broad range of from 300 amps at 30v to 25 amps at 10v. • Complete specifications, as well as recommendations for your particular application problems, will be sent promptly upon request.

miller ELECTRIC MANUFACTURING CO., INC., APPLETON, WISCONSIN

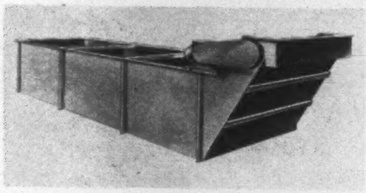
Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

from the standpoint of performance and initial cost. It lasts up to two and a half times longer than malleable abrasives, although not as long as premium grade steel shot. Speed of cleaning is faster than the lower hardness malleables; the same as the harder malleable abrasives, but less than steel of higher hardness. (Pangborn Corp.)

For more data circle No. 46 on postcard, p. 105

Settling System

For settling out large particles from mineral-type oil or water-soluble coolants, conveyorized settling systems come in tank sizes with holding capacities of 1000 gal and upward. The conveyorized system handles industrial plant settling requirements both efficiently and economically. Operation is automatic from the start to the point of dropping sludge into the sludge disposal container. The system entails no servicing. Only occasional emptying of the sludge pan is required. (Olson Filtration Engineers)



For more data circle No. 47 on postcard, p. 105

Immersion Compound

For aluminum work, a zincate immersion compound coats aluminum with a tightly-bonded film of metallic zinc, before electroplating with other metals. The compound is a rapidly soluble, free-flowing granular material. It does not cake under normal storage conditions. (The Diversey Corp.)

For more data circle No. 48 on postcard, p. 105

Dressing Tools

Non-resettable, a line of diamond dressing tools gives savings and efficiencies in grinding wheel dressing costs. Fine, single-point diamonds are used in these tools, thus allowing for a maximum number of wheel dressings per tool. Some of the advantages derived from this tool are: elimination of resetting, lower initial costs and inventory reductions. The tools come in a variety of shapes and diamond sizes for all type straight and form dressing needs. (Diamond Tool Research Co., Inc.)

For more data circle No. 49 on postcard, p. 105

Meters Two Fluids

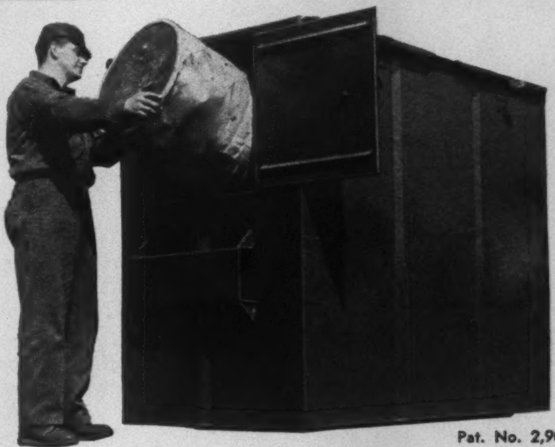
Metering two fluids, in any ratio, a device then pumps them into a spray gun. In the gun, the materials are mixed a split second before being sprayed. Materials with reaction times as low as four seconds can be successfully sprayed. (Binks Mfg. Co.)

For more data circle No. 50 on postcard, p. 105

Jack Setup

A clamp and jack unit is ideally suited for clamping and jacking on medium and small machines. Components consist of swivel bases and strap clamps that are assembled to-

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY...



Pat. No. 2,900,096

DEMPSTER - DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant housekeeping was vastly improved.

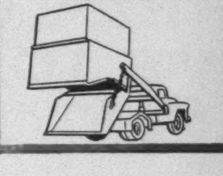
In all major cities, private haulers who own DEMPSTER-DUMPMASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request

Dept. IA-10 DEMPSTER BROTHERS Knoxville 17, Tenn.

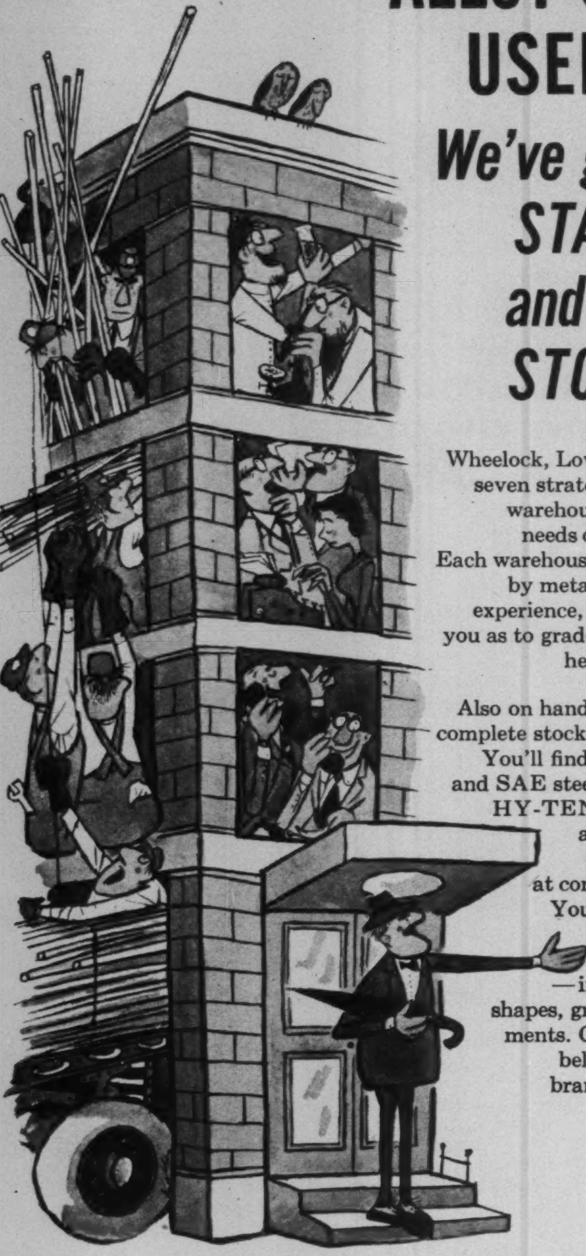
DEMPSTER- DUMPMASTER

DEMPSTER-DUMPSTER



DEMPSTER DUMPMASTER

EQUIPPED PRIVATE HAULERS



ALLOY STEEL USERS!

We've got the STAFF... and the STOCK

Wheelock, Lovejoy maintains seven strategically-located warehouses to serve the needs of its customers. Each warehouse is fully staffed by metallurgists of long experience, ready to advise you as to grades, applications, heat treating, etc.

Also on hand at all times are complete stocks of alloy steels. You'll find standard AISI and SAE steels, and our own HY-TEN steels, offering advanced metallurgical features at competitive prices. You can order your alloy steel — as you need it — in specified sizes, shapes, grades, and treatments. Check the listing below for the W-L branch nearest you.

W-L STEEL SERVICE CENTERS – Cambridge • Cleveland
Chicago • Hillside, N. J. • Detroit • Buffalo • Cincinnati
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"The Alloy Steel Center"

WHEELOCK,
LOVEJOY
& COMPANY, INC.
130 Sidney St., Cambridge 39, Mass.

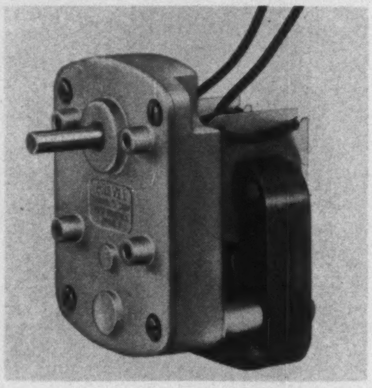
STEEL SERVICE CENTER INSTITUTE

gether to provide an infinitely adjustable support for the clamp. Also included are spacer tubes that allow for additional clamping heights when assembled with the swivel bases and spacer tubes. The tubes and swivel bases can be used in conjunction with a special base making an adjustable jack for work support. (Universal Vise & Tool Co.)

For more data circle No. 51 on postcard, p. 105

Gear Motor

With the field mounted directly behind the gear housing, an enclosed gear motor has output speeds from 6-120 rpm. Output running torques are 12 in.-lb at 6 rpm for continuous duty. The motor can be geared for a variety of speeds higher and lower than standard, and wound for higher torques at intermittent loads. Its nylon bobbin withstands temperatures up to 120°C. Noise of the motor is kept to a minimum without power loss. They are designed for use in business machines and as a control device in large equipment. (Brevel Products Corp.)



For more data circle No. 52 on postcard, p. 105

Epoxy Glue

An epoxy glue bonds "anything to anything." It forms a hard, permanent adhesive, stronger than materials themselves. It it waterproof, transparent and has literally thousands of industrial and manufacturing uses. (Magic Iron Cement Co., Inc.)

For more data circle No. 90 on postcard, p. 105

Gleason Works announces automatic gear tester operation through tape control

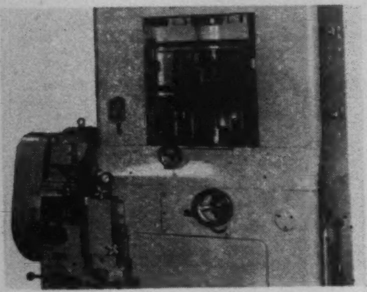
Electronic tape control on Gleason Production Testers will make your bevel and hypoid gear tester operation an automatic process. Tape controls will allow you to automatically pre-set and vary test factors—direction of rotation, tooth bearing position, pinion spindle speed and brake load—in any sequence you wish.

Once you tape the test sequence, you can repeat it exactly anytime—for the next pair of gears or repeat the set-up months later.

Write us. We will be pleased to send additional information.

GLEASON WORKS
1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.

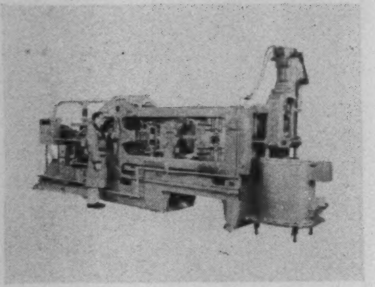
New Equipment and Machinery



Briquetting Press Features Floating Die Table

With 2⅜ in. depth to fill, a mechanical briquette press is built for dry-pressing powdered metal, ceramic materials and carbon. It can also dry-press any other powdered material which can be formed by pressing. The press comes with a hydraulically-controlled floating table. This insures uniform distribution of density throughout the compacts. A compact hydraulic unit consists of accumulator, pressure relief and check valves. The hydraulic unit provides infinitely - variable control of the relative bottom pressure. (Haller Inc.)

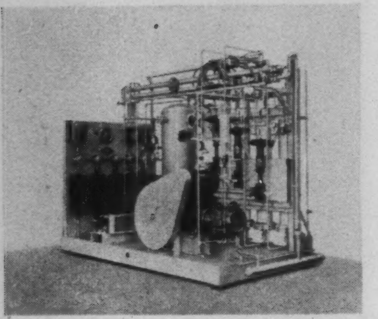
For more data circle No. 55 on postcard, p. 105



Zinc Die Caster Gives Adequate Locking Tonnage

Delivering 450 tons of clamp, a zinc die caster has a high ratio of die opening stroke to clamping tonnage. The die opening stroke is adjustable from 8-30 in. The unit will produce deep drawn zinc parts weighing up to 15¼ lb. The machine incorporates a zinc end which is completely self-aligning. It requires only one adjustment for final setup. Both the shot pressure and shot speed are adjustable. The alloy steel frame insures permanent parallel alignment of the platens. Bumpers provide timed casting ejection. (Lester-Phoenix, Inc.)

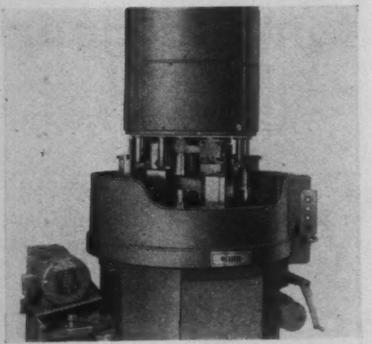
For more data circle No. 56 on postcard, p. 105



Compact Pilot Plant Produces Hydrogen

A 750 standard cu ft per hour pilot plant produces relatively pure hydrogen. The new process is two stage. The first dissociates the H_2 and N_2 in commercial anhydrous ammonia. This first stage uses an ammonia dissociator. The second stage employs a continuously cycling adsorption process. This process separates the H_2 from the N_2 gas. The process uses either liquid or gaseous ammonia. The pilot plant produces hydrogen from 82.0-98.0 pct purity, the balance being N_2. All the equipment for a 750 scfh plant is about 10-ft high when mounted on a steel skid 6 x 12 ft. (The Electric Furnace Co.)

For more data circle No. 57 on postcard, p. 105



One Lathe Provides Productive Capacity of Four

Designed for long-run maintenance economy, a vertical continuous lathe handles work in a wide range of sizes, interchangeably or mixed. The lathe combines the productive capacity of four lathes in one compact unit. Its continuous operation saves indexing time. Wide open tooling areas allow great flexibility in the tooling procedure on each spindle. The machine can accept a workpiece up to 8 in. in diam. It has a vertical slide stroke up to 5 in. and a cross slide stroke to 4 in. for roughing or finishing operations. Vertical rod stroke goes up to 8 in. for work locating or secondary vertical station for boring or drilling. The unit can produce up to 1800 pieces per hour. (The Baird Machine Co.)

For more data circle No. 58 on postcard, p. 105

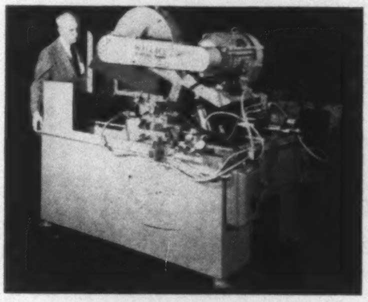
Compact Degreaser

A subsonic degreaser features high-production automatic in-line cleaning for all small parts, without manpower. An unusual vibrating spiral elevator moves the work rapidly through non-flammable cleaning solvents and vapors. This eliminates tote pans and baskets. The unit is 20-in. square with a 42-in. overall height. It will process the full capacity of any screw machine, cold header or punch press. Chips are automatically separated and clean dry parts continuously emerge ready for inspection. (Manpro Corp.)

For more data circle No. 59 on postcard, p. 105

Cut Machine Units

Cut machining units cut up to 8-in. solid high-alloy bars, with micro-finish dimensions. These machines cut at a rate of from 4-10 seconds. This cutting rate depends upon the character of the material being cut for each square inch of material cut.

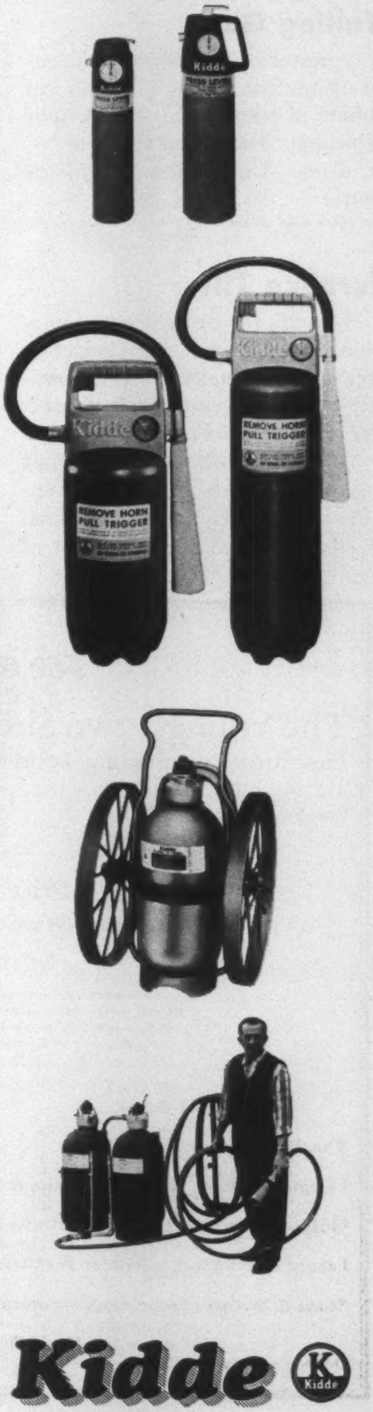


An external and separate supply of coolant is pumped through a three-way coolant distributing system, at the rate of up to 45 gpm. This keeps the work cool. (Wallace Supplies Mfg. Co.)

For more data circle No. 60 on postcard, p. 105

Straightening Machine

With vertical straightening rolls, a small straightening machine accurately straightens tube sizes from ⅛ in. to about ½ in. in diameter. It is especially designed for tubing with thin walls and where special surface finish is required. One of the important features of this machine is that it will also straighten the ends of the tubing. The machine comes equipped with three straightening speeds. All three



NOW! GET FULL-POWER FIRE FIGHTING WITH KIDDE'S DRY CHEMICAL LINE!

2½ and 5 pound pressurized units! Granted top rating by U.L., these two units pack the extra punch needed to get the jump on fire. For example, the 2½ pound Kidde unit is as compact as a 1 quart carbon tet model, yet is eight times as powerful! Both the 2½ and 5 feature simple, two-step operation, easy-to-read dust-and-moisture-proof gauges. 10 pound dry chemical also available.

20 and 30 pound pressurized dry chemicals! Both these Kidde units have the same good features of the 2½ and 5, plus some "extras" all their own. Center balanced for fast action, rugged diffuser horn, speedy trigger operation, recessed pressure gauge and enclosed mechanism.

200 pound dry chemical wheeled unit! Kidde's 200 pounder discharges a 40-foot stream faster, has an *extra* 50 pounds of fire-smothering dry chemical to knock down fire quicker. Low center of gravity and wide wheels make it easy to maneuver. Easy-to-use discharge control makes operation simple.

400 pound stationary unit! Here's maximum protection in a minimum package! Like all Kidde units, this features sure, dependable performance and fast, easy operation. Either wall-mounted or free standing, leakproof and tamperproof, exclusive Bridgeman Seal, universal long-range nozzle, easy-to-read pressure gauge. 200 pound model also available.

Get the jump on oil, gas and electrical fires! Learn more about the complete line of dependable, efficient Kidde equipment—write today!

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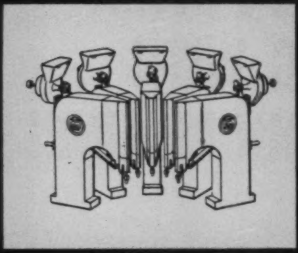


NEW "BUILDING BLOCKS" for automatic riveting

Milford's Models 56 and 57 offer unlimited flexibility in automatic assembly!

Group these new "Building Blocks" to suit your production needs. Use them singly, in pairs, in threes, fours or even fives. Write for more information on multiple riveting, the newest answer to reducing assembly costs.

For more new ideas, tips and technical data on tubular rivets and rivet-setting machines, ask your Milford Representative for a look at Milford's new MANUAL OF MODERN RIVETING PRACTICE.

THE MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • HATBORO, PENNA.
ELYRIA, OHIO • AURORA, ILL. • NORWALK, CALIF.

roller pairs are motor driven. The three top rolls and the middle lower roll are vertically adjustable. (Straus-Artys Corp.)

For more data circle No. 61 on postcard, p. 105

Nailing Gun

A portable, single-blow automatic nailing gun drives 120 nails per minute in sizes up to 2½-in. long (8-penny). Heads can be up to ⅜-in. diam. (United Shoe Machinery Corp.)

For more data circle No. 62 on postcard, p. 105

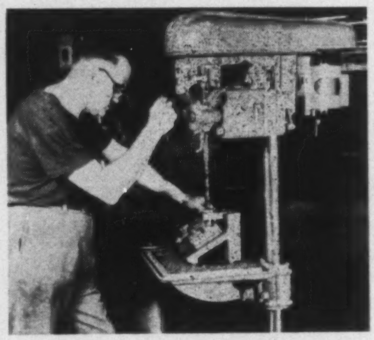
Furnace Tilter

Hydraulically-operated, a rotary tilting mechanism for induction melting furnaces, affords more positive control of pouring. It also offers uniformity of pour stream. The mechanism mounts on either side of the furnace about at trunnion level. This elevated location, coupled with its precise control of pouring action, reduces the possibilities of damage caused by burnouts or spilled metals. (Inductotherm Corp.)

For more data circle No. 63 on postcard, p. 105

Drill Press

Improved precision and operating economy are claimed for a line of 17-in. drill presses. The drill presses come with hand or power feed, in bench or floor models and in single or multiple spindles. Nominal capacity is ⅝-in. diam holes in steel, ¾-in. in cast iron. The new drill press provides an internal



$60,000,000

The Youngstown Sheet and Tube Company

First Mortgage Sinking Fund 4½% Bonds, Series H, due 1990

Dated October 1, 1960 — Due October 1, 1990

Price 98⅜%
(plus accrued interest)

This announcement constitutes neither an offer to sell nor a solicitation of an offer to buy these securities. The offering is made only by the Prospectus, copies of which may be obtained in any State from such of the undersigned as may lawfully offer these securities in such State.

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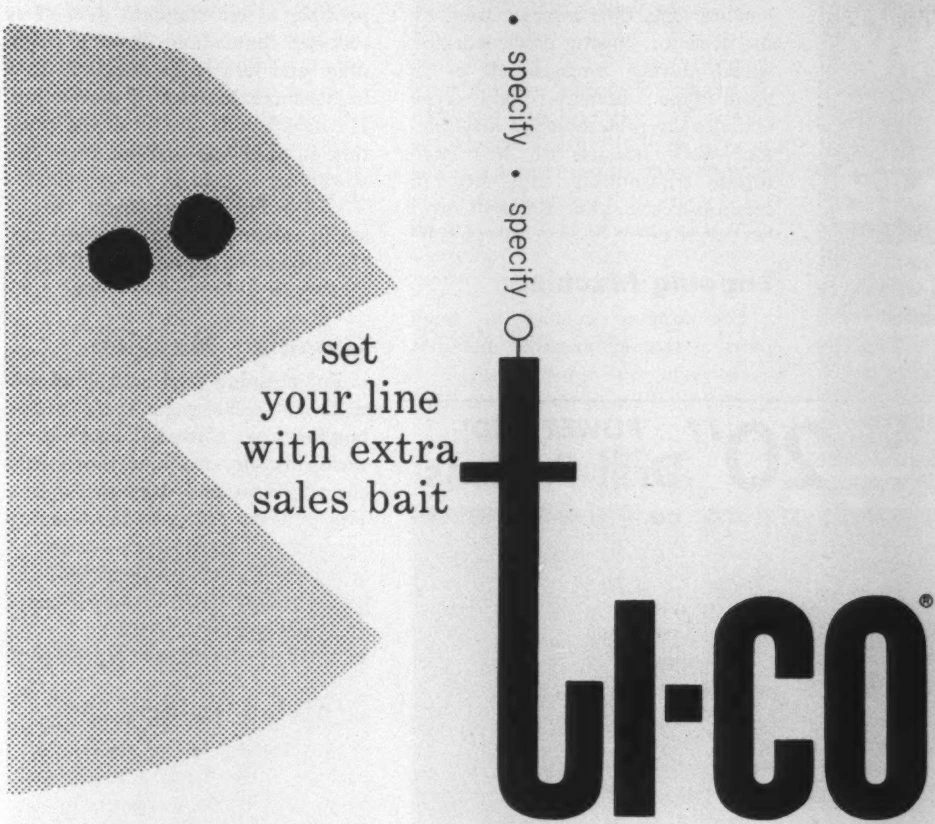
October 5, 1960



TI-CO® NON-FLAKING GALVANIZED SHEETS

for COST SAVINGS

With today's squeeze between manufacturing cost and a selling price that moves products with satisfactory profit, every production saving deserves careful consideration. That's why many manufacturers are using Inland TI-CO galvanized sheets to more economically provide corrosion resistance for their product. ■ Many times TI-CO can be substituted for more expensive materials. TI-CO can eliminate the need for protective painting . . . often is less expensive. Or, if in your processing you normally form and then pot-dip production parts, this costly step can be eliminated by simply forming the part with the galvanized sheet that takes the toughest fabricating, yet won't chip, peel, crack or flake . . . TI-CO. You'll add extra "sales bait" at the purchaser's level too!

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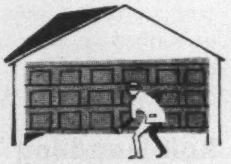
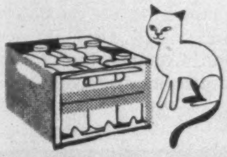
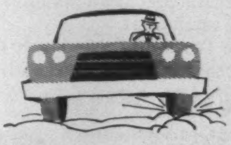


Garage door maker saved costs of pot-dipping zinc coated steel rails and hardware when he switched to non-flaking TI-CO.



Manufacturer of milk cases obtained corrosion resistance and increased strength at reduced cost when he substituted non-flaking TI-CO for more costly metal.



TI-CO eliminated painting of hot rolled steel and provided added corrosion resistance for auto wheel suspension component.

depth stop with long spindle travel —5 in. (Delta Power Tool Div., Rockwell Mfg. Co.)

For more data circle No. 64 on postcard, p. 105

Machine-Tool System

The engagement of a tooth clutch during the high-speed operation of a machine tool is permitted by a new machine-tool system. The system prevents time losses caused by the need for slowing down working speed during engagement of a tooth - type clutch. Tooth - type clutches are preferable for machine-tool work because of their high torque transmitting capability, in relation to size. (The Bendix Corp.)

For more data circle No. 65 on postcard, p. 105

Lapping Machine

For lapping centers in small parts, a lapping machine makes it possible to lap standard as well as recessed center holes from 1/16-in. diam and larger. It does this at a highly-increased rate of production. It can lap both centers at the same time in pieces up to 8-in. long. The workpiece is held in two adjustable V's, allowing center holes to be offset in relation to the diamond lap. (J&S Tool Co., Inc.)

For more data circle No. 66 on postcard, p. 105

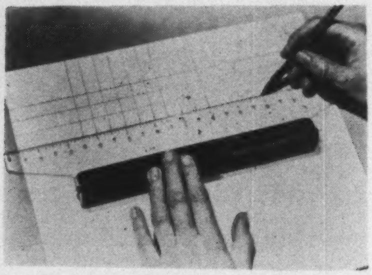
Cleaning Machine

For cleaning steel and aluminum #22 to #30 gage sheet before bonding to plywood backing, a wash-rinse-dry machine thoroughly cleans, rinses and dries the sheets. This is so necessary to the bonding operation. The machine—operated at a mean conveyor speed of 25 fpm—had to be built 119-ft long. (The Alvey-Ferguson Co.)

For more data circle No. 67 on postcard, p. 105

Drawing Ruler

A plastic 12-in. combination triangle, T-square, and parallel ruler draws vertical, horizontal and angular parallel lines in automatically measured distances. Built-in rollers allow smooth, easy movement up or down when drawing lines. A spiral index window automatically indicates distances between horizontal and angular lines as close as 1/16-in. Lines can be spaced the same or varied distances apart. Circles and arcs can be scribed up to a diameter of 22-in. (Rol-Ruler Co.)

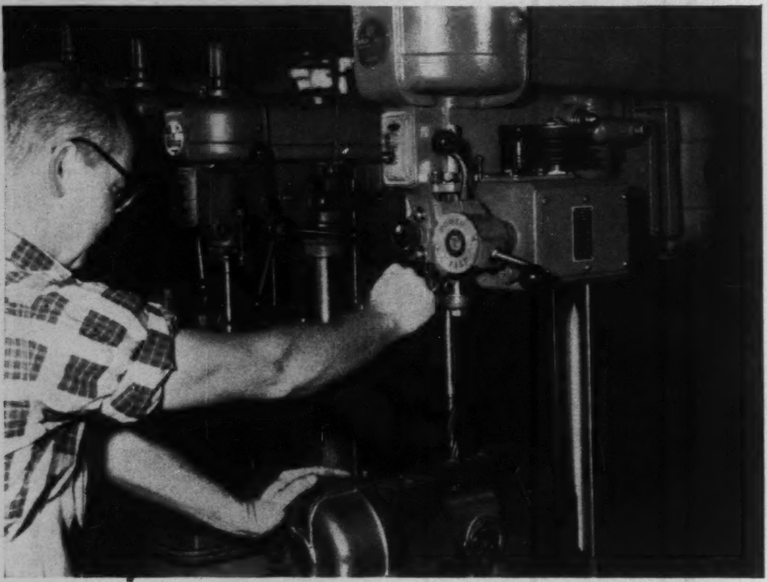


For more data circle No. 68 on postcard, p. 105

Roll Handling Truck

A practical, "walkie" style roll handling truck transports heavy rolls of rubber, paper and other loads in the horizontal position.

WALKER-**T**URNER 20" 'POWER FEED' Drill Presses



New idea for heavy duty drilling

Here is the most advanced step in drill press power feed development to date—available in 16 models of the new W-T "Light-Heavyweight" 20" 'Power Feed' Drill Press line. Ideal for continuous, heavy duty production drilling, these machines can boost output and reduce operator fatigue, yet maintain close tolerances on repetitive operations.

A unique front-mounted pilot wheel is mechanically integrated with the clutch control to provide effortless, one-hand operation *never before available* on a standard drill press. Your Walker-Turner Distributor (listed under "TOOLS" or "MACHINE TOOLS" in the Yellow Pages) will gladly demonstrate many other outstanding features that can save you money. So see the new W-T 20" 'Power Feed' Drill Presses *in action* soon! Complete line of money-saving accessories also available.

FREE BROCHURE—Complete specifications on the new 20" floor, bench, overhead and multiple-spindle models, write: Rockwell Manufacturing Company, Walker-Turner Division, Dept. WK-28, 400 N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ontario.

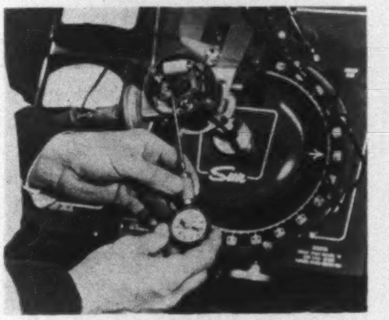
WALKER-TURNER
"LIGHT-HEAVYWEIGHT" MACHINE TOOLS
another fine product by
ROCKWELL

Horizontal positioning of the load enables the operator to maintain a clear view when positioning the load. Horizontal positioning also enables the roll to be directly fed to machines. (Lewis-Shepard Products Inc.)

For more data circle No. 69 on postcard, p. 105

Spring Tension Gage

A spring tension gage measures the "breakaway" force needed to move an object held by a spring member, inertia or friction. The new gage features a uniformly graduated dial and knife-edged pointer. These features permit easy, accurate readings over the entire scale. It is a "push-pull" instrument with the zero reading at the top of the dial. Compression readings move pointer counterclockwise; tension moves pointer clockwise. Guaranteed accuracy for either side of scale is 2 pct. (United States Gage Div., American Machine & Metals, Inc.)



For more data circle No. 70 on postcard, p. 105

Rubber-Covered Doors

Access doors for industrial plants are completely rubber-covered to withstand the shock impact of fork-lift trucks as they pass through. The door has a core of fiberglass—tough, light and non-warping. The door edge is protected by soft rubber, ¾-in. thick, making the closure draft-tight and split-uroof. The doors come fitted with windows of shatter-proof, clear Lucite. (American Hard Rubber Co.)

For more data circle No. 71 on postcard, p. 105

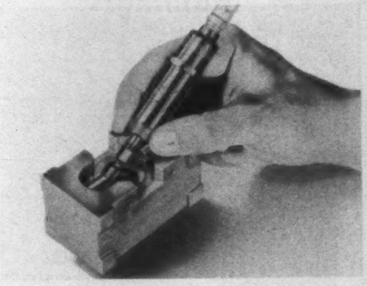
Portable Tool Bench

Saving steps and tool handling, a portable tool bench has a choice of 22 interchangeable drawers. They may be securely locked. The bench also has 24 small parts pockets. Four wheels enable a person to push the bench across any surface quickly and easily without tipping. It has a large top that may be used as a workbench or to mount additional equipment. (Roll-On Mfg. Corp.)

For more data circle No. 72 on postcard, p. 105

Small Air Tool

Bigger bearings and larger rotor shaft are two of many construction improvements on a small air tool for precise grinding. The one-piece steel motor housing and ring



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SPRING
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is the rule

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COUPLING A BILLION HORSEPOWER

Don't take chances on couplings

CHECK PUBLISHED MISALIGNMENT RATINGS BEFORE YOU BUY

Since misalignment is the basic problem that shaft couplings are designed to solve you'll find a published conservative misalignment rating (along with load capacity rating) for every Fast's Coupling. Compare it with the misalignment rating of any other coupling you are considering.
One further advantage of Fast's Couplings' misalignment ratings: You save money on installation because, knowing the ratings, you don't have to line up driving and driven elements with pinpoint accuracy. It's one more important reason why Fast's Couplings are the choice of more equipment manufacturers than any other gear-type coupling. KOPPERS COMPANY, INC., 210 Scott Street, Baltimore 3, Md.

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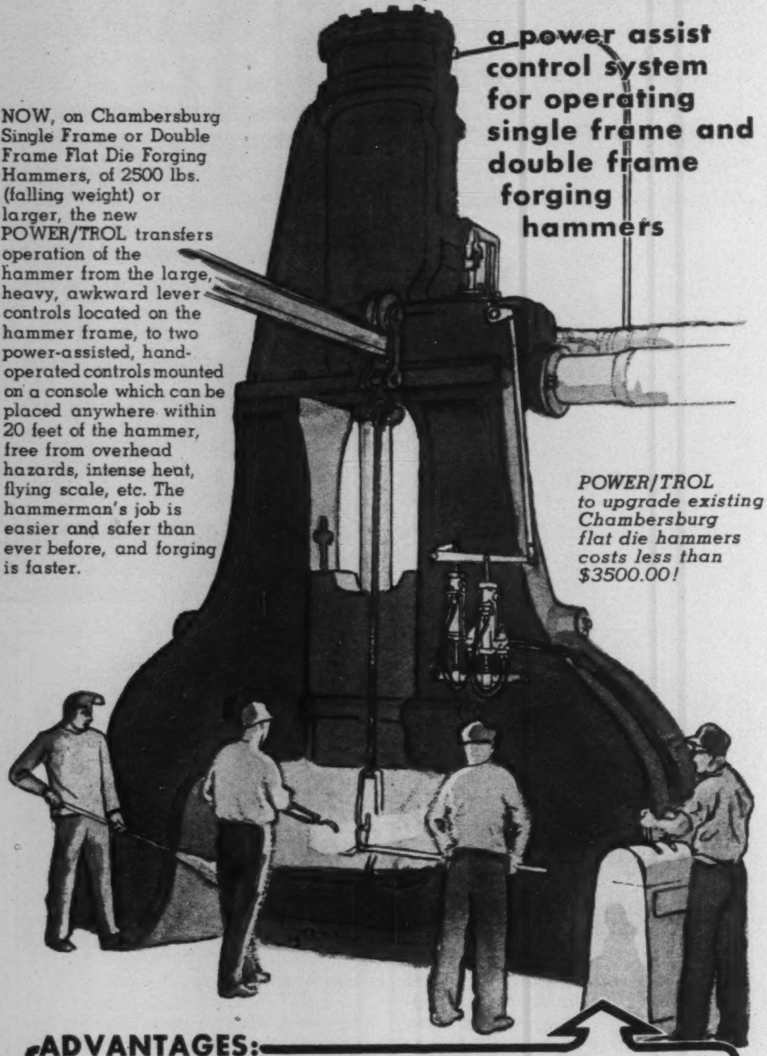
NEW! CHAMBERSBURG
POWER/TROL



a power assist control system for operating single frame and double frame forging hammers

NOW, on Chambersburg Single Frame or Double Frame Flat Die Forging Hammers, of 2500 lbs. (falling weight) or larger, the new POWER/TROL transfers operation of the hammer from the large, heavy, awkward lever controls located on the hammer frame, to two power-assisted, hand-operated controls mounted on a console which can be placed anywhere within 20 feet of the hammer, free from overhead hazards, intense heat, flying scale, etc. The hammerman's job is easier and safer than ever before, and forging is faster.

POWER/TROL to upgrade existing Chambersburg flat die hammers costs less than $3500.00!

ADVANTAGES:
- **the hammerman is at a safe location, convenient to his crew**
- **hammer operation is practically effortless**
- **blow sensitivity is retained**
- **more forging can be accomplished each heat**

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DESIGNERS AND MANUFACTURERS OF THE IMPACTER

When it's a vital part, design it to be FORGED

throttle provide greater strength and durability. The exhaust system has a built-in muffler. The grinder measures 13/16-in. diam by 3⅞-in. long, with a 13/32-in. offset. Ring throttle provides infinite speed control over the vane-type air motor's 0-50,000 rpm range. Rated capacity of the tool is ½-in. mounted points. (Buckeye Tools Corp.)

For more data circle No. 73 on postcard, p. 105

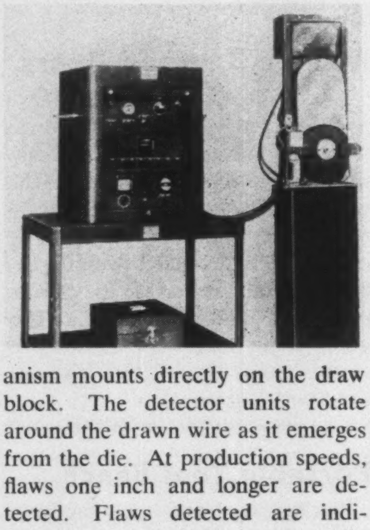
Milling Machine

A 14-ft adjustable-rail milling machine maintains tolerances of 0.002 in. between the vertical and horizontal joints of huge low-pressure steam-turbine casings. The machine is equipped with a highly-accurate transducer. This automatically keeps the machine guide rail level with its table to insure a high degree of accuracy in all horizontal surface cuts. The bed length of the machine is 110 feet. (Westinghouse Electric Corp.)

For more data circle No. 74 on postcard, p. 105

Detects Flaws in Wire

Open surface flaws of 0.004-in. or more in depth, in magnetic or non-magnetic cold-drawn steel coiled wire up to 1-in. diam, can be detected. Utilizing the advanced eddy-current technique of inspection, the unit's rotating head mechanism mounts directly on the draw block. The detector units rotate around the drawn wire as it emerges from the die. At production speeds, flaws one inch and longer are detected. Flaws detected are indicated by a visual light and an audio

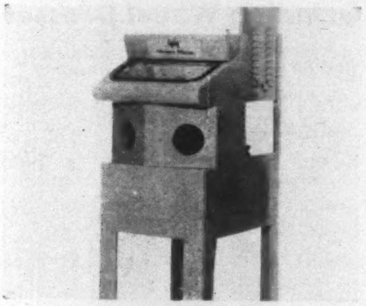


signal. A paint spray marks the flaw area. (Magnetic Analysis Corp.)

For more data circle No. 75 on postcard, p. 105

Liquid Blast Machine

Designed to fill the need for tool grinders, heat treaters, platers, brazers, machine shops and electronic shops, a liquid blast machine has a maximum air consumption of only 20 cu ft per minute at 100 psi.

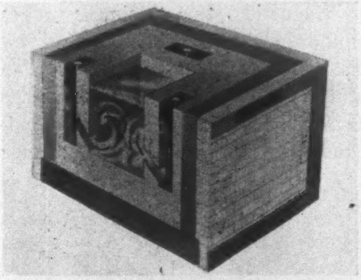


The pump is rated at 40 gpm with a ⅓-hp, 110-v single-phase motor. Electrically-controlled solenoid valves regulate air supply and the window washing mechanism. (Hydro-Hone Corp.)

For more data circle No. 76 on postcard, p. 105

Salt-Bath Furnace

The manufacturer's cross-channel salt-bath furnace embodies an entirely new concept in salt-bath heating. In this furnace, heating is accomplished by passing electric current through pairs of oppositely sloping passages or tunnels in the walls. The walls separate the main portion of the salt bath from adjacent small wells where current is introduced by ordinary hanging electrodes. (Upton Electric Furnace Co., Inc.)



For more data circle No. 77 on postcard, p. 105

Puts Marks on Teflon

Marking part numbers and other information on Teflon is possible with a high-potency compound. It reacts with the Teflon surface to create a dark carbon film. The film is completely impervious to the temperatures normally encountered in Teflon service. The treating agent is supplied in a polyethylene squeeze bottle with a long, tapered nozzle. The viscosity of the material is designed so that no fluid will leak out of the nozzle unless pressure is applied, permitting the bottle to be used as a writing "crayon." (Plastic Assoc.)

For more data circle No. 78 on postcard, p. 105

Prevents Corrosion

A long-term protective coating prevents corrosion of metals in production processes, storage and shipment. The coating has an affinity for metal. It penetrates grain boundaries, cracks and pores to form a continuous protective film from 1-8 microns thick. (Corrosion Reaction Consultants)

For more data circle No. 79 on postcard, p. 105

Weighing System

Combining scales with calculators and other equipment, provides a

MANY FAST'S HAVE BEEN WORKING LONGER THAN YOU

It's a fact. There are plenty of cases where Fast's Couplings have been in service 20 to 40 years. And some of our more enthusiastic engineers say a Fast's should last forever if it's properly applied, installed and lubricated. Whatever opinion you accept, you can bet Fast's Couplings will give you the same smooth-running, low-maintenance, long-lived performance that makes them the choice of more equipment manufacturers than any other gear-type coupling.

For example, Fast's Coupling No. 1347, shipped in July, 1922, is still in service—and the customer is just ordering his first spare coupling 38 years later. KOPPERS COMPANY, INC., 210 Scott Street, Baltimore 3, Md.

KOPPERS

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MULTIPLE SPINDLE

CHUCKING MACHINES

Tool Rotating

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FORGINGS

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CANTON, OHIO

low-cost semi-automated weighing system for process, quality and cost control. Product weighing is done on a scale. This scale employs an optoelectrical principle of frictionless weight indication. A high-intensity light beam indicates product weight on a frosted glass scale dial. As weight is indicated, the light beam activates from two to seven photoelectric cells. These cells generate electrical signals. Directed through amplifier and relay circuits, these signals are available to do work. (The Exact Weight Scale Co.)

For more data circle No. 80 on postcard, p. 105

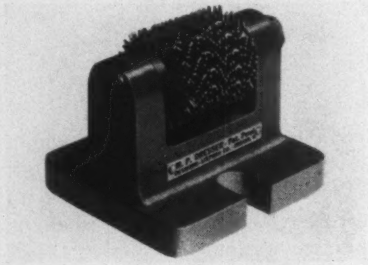
Hobbing Machine

A vertical, heavy-duty hobbing machine produces accurate gears. Final gear grinding operations are unnecessary. The machine cuts two automotive-type helical gears at the same time on a single spindle. This takes just 25 minutes. An automatic shift for the hobbing tool simplifies operation of this 12-in. diam capacity machine. Only remaining operation (performed on another machine) is deburring. (The Lees-Bradner Co.)

For more data circle No. 81 on postcard, p. 105

Grinding Wheel Dresser

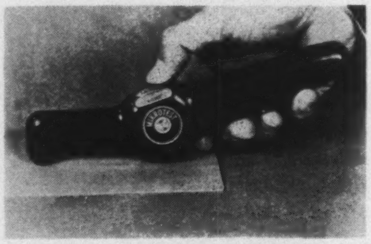
A grinding wheel dresser restores the shape and grinding action of worn, loaded and out-of-shape abrasive mounted points. The revolving mounted point is held against the thin gage star-type cutters. It is held for a few seconds until the original shape of the mounted point is restored. (Desmond-Stephan Mfg. Co.)



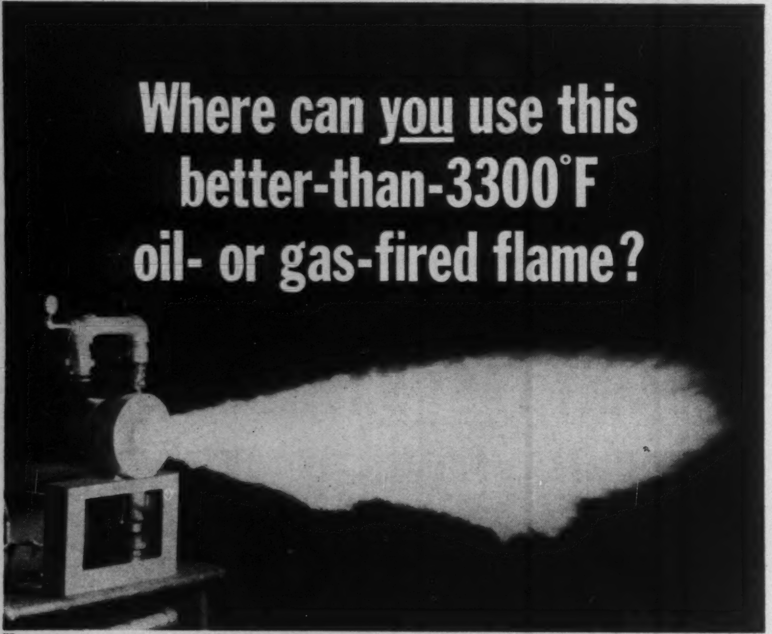
For more data circle No. 82 on postcard, p. 105

Thickness Gages

Magnetic film thickness gages come in two ranges. One is for lacquers and enamels. It has a range of 0-20 mils. The other gage is for measuring platings and galvanizing. This one has a range from 0-2 mils. They both respond with a click that can be heard and felt when the correct measurement is made. Human differences in touch do not affect the readings. (Nordson Co.)



For more data circle No. 83 on postcard, p. 105


Where can you use this better-than-3300°F oil- or gas-fired flame?

The revolutionary Bliss Pulsation Burner produces temperatures never before achieved with oil or natural gas. Burning oil, it can reach a searing 3450°F. On 1000 BTU/cu. ft. natural gas, it develops 3320°F. Both these extremely high temperatures are close to the theoretical limits for these two fuels. Foundries, smelters, heat treaters and other metal processers have been quick to take advantage of the remarkable combustion efficiency of these new burners. To them, it has meant faster heating cycles, cleaner flue gases, and above all, fuel economy that cuts from 12% to 30% from their furnace overhead. Not to speak of reduced maintenance on refractory linings.

To learn how the Bliss Burner can increase the heat output in your plant while it's saving you money in fuel and furnace maintenance, write today for our Bulletin No. 60. It's yours for the asking.

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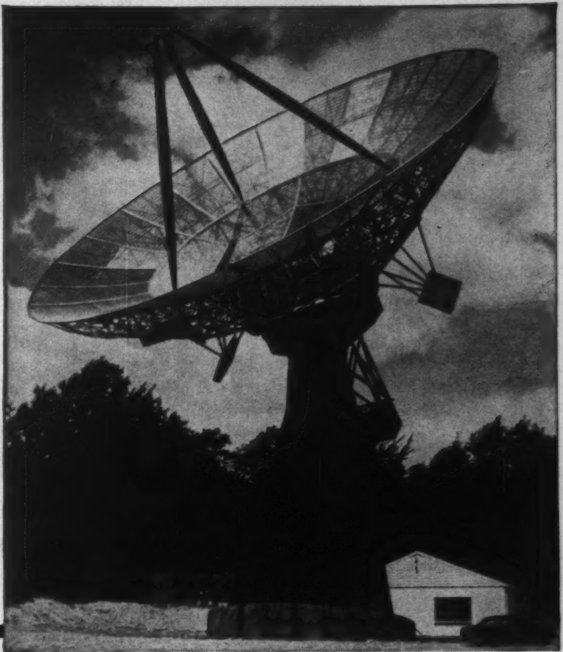
NEW FILMS

"Case Goods Handling With the Cart-N-Grab," shows how company lift trucks with Cart-N-Grab clamps have increased handling efficiency. The units were filmed on the job in major warehouses in three large cities. 11½ minutes, color, sound. Hyster Co., P. O. Box 847, Danville, Ill.

"Vacuum Pouring for Better Forgings," describes each step in the vacuum pouring process, from preparation of the equipment to the pouring of a multiple-heat ingot. A high-speed television camera peers into the vacuum chamber to show the molten stream of metal exploding into countless tiny droplets, in order to release the trapped hydrogen gas into the vacuum. 15 minutes, sound, color, 16 mm. Bethlehem Steel Co., Bethlehem, Pa.

"Ionization and Ionic Equilibrium," provides a visualization of one of the more abstract areas treated in elementary chemistry courses. Through the use of animation, the concepts of ionization, dissociation and ionic equilibrium are brought to life on the screen. The film also provides an introduction to the more difficult concepts of the ionization constant and buffered solutions. 15 minutes, 16 mm. Available in color or black and white. Indiana University, Bloomington, Indiana.

"How to Harness a Ram," describes the use of hydraulic power in such jobs as handling rolls of paper; operating a cross-over bridge spanning a sunken rail track; raising crates from the floor to the bed of a motor carrier; sustaining stockpile levels in machine feeding operations; and other lifting jobs. 15 minutes, sound slide film. Synchronized commentary is provided by a 12-in., 33 rpm record with bell note signal. Globe Hoist Co., E. Mermaid Lane at Queen Street, Phila., 18.



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CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
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It takes real accuracy in gearing to turn an 84-ft. radio telescope at that speed. Backlash on the Cone-Drive double-enveloping worm gear set used in the complex drive system was held to 0.0012-inch.

Dependable Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

COUPLING A BILLION HORSEPOWER

More equipment manufacturers choose Fast's Couplings than any other gear-type coupling

Leaving other claims aside, the thing that counts in couplings is customer confidence—and industrial equipment manufacturers have made Fast's their overwhelming choice. The Fast's line is more diversified, too—in a complete range of sizes and types for shafts, from ½" to 32" and larger.

Every Fast's Coupling brings you superb engineering only the original gear-type coupling can deliver. Smooth-running units that are designed to outlast the machines they connect. Rapid service from experienced field engineers backed by outstanding stock facilities. Write today for full details on couplings to suit your needs to: KOPPERS COMPANY, INC., Fast's Coupling Dept., 210 Scott St., Baltimore 3, Maryland.

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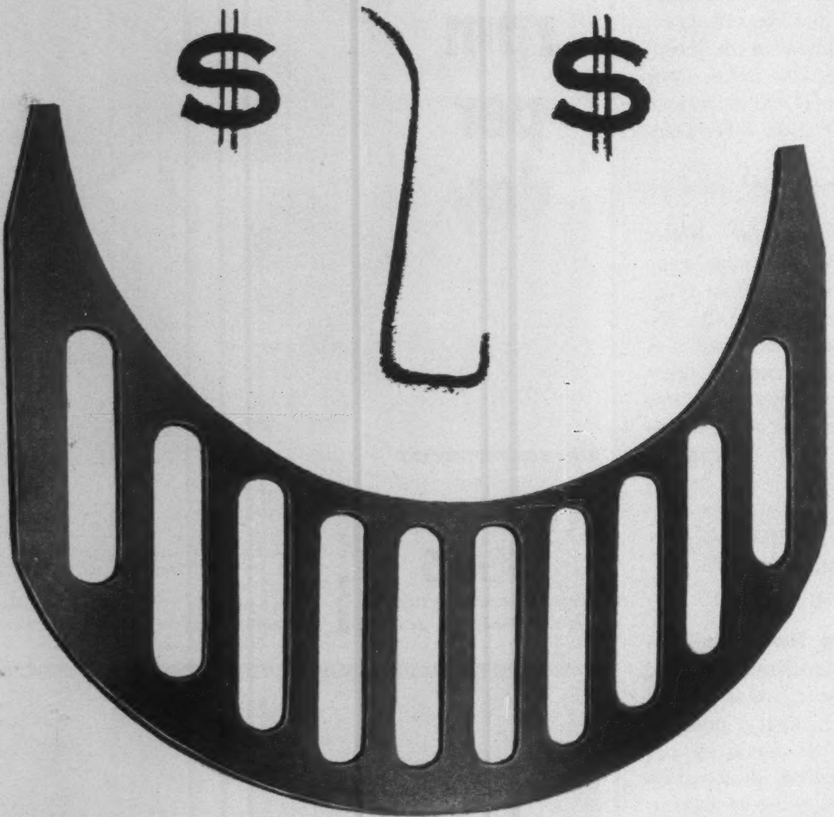
Now . . . Look to Lukens For Steel Shape Savings



Face up to the true cost of inventories

$253.50 *in interest alone.* That's what it would have cost our customer to stock the steel for his order of these 5-16" gage tube sheets—had he decided to blank and punch these shapes in his own plant. His plate stock cost would have been $25,350. The interest cost of carrying this for 90 days at—say 4%—is $253.50.

Fortunately, the customer took advantage of Lukens Steel Plate Shapes Service and avoided tying up his capital in plate inventory. *Plus:* he paid no freight charge on the 50% scrap involved . . . instead he was given an allowance for the scrap at high steel mill prices. He avoided the expense of scrap handling. He eliminated the problem of shop spoilage.

Moral: Don't tie up capital in steel plate inventories. Contact Lukens for Steel Plate Shapes Service . . . flame cutting, shearing, blanking, pressing, bending, welding—of carbon and alloy plate produced on our own rolling mills. Call or write Fabrication Building, Lukens Steel Company, Coatesville, Pennsylvania. Address Dept. A-100.

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Fabrication Building, Dept. A-100.
Coatesville, Pa.

Please send me your free booklet on Steel Plate Shapes.

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STEELS IN STEP WITH SCIENCE

LUKENS STEEL COMPANY
LUKENS steel plate shapes

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The Iron Age Summary

End to Cutbacks May Aid Sales

Steelmakers are a little more optimistic this week, based on belief inventory cutbacks are nearing end.

If stock reductions are finally over, fourth quarter shipments could rise 2½ to 4½ million tons just to keep up with consumption.

▪ The inevitable end of inventory cutbacks, backed up by a small improvement in new orders, gives the steel market a slightly better tone this week.

A cautioning word: The improvement may be more psychological than real. The order upturn is scarcely seasonal and may be another false start. The inventory factor is statistical and few instances of inventory rebuilding are noted.

Inventory Outlook—Nevertheless, many analysts contend that the only thing working for an order improvement is the overall level of steel inventories. Here is is how the inventory picture looks:

Market analysts believe that from 2½ to 4½ million tons of steel were liquidated in the third quarter. This means that much more was consumed than shipped. If liquidation ended now, it could mean that from 2½ to 4½ million more tons of steel would be shipped in the fourth quarter than the third, just to keep up with steel consumption.

However, the inventory analysis does not show where inventories are located. In other words, with much of metalworking on a recession basis, even depleted inventories do not necessarily mean an upturn in new orders.

Orders Reach Output—Steel orders are now up to the rate of steel operations. This means an improvement, but does not mean a significant change in steel operations.

And even the statistical gain expected from inventories can be discounted to some extent. Consumption of steel is declining in some major steel-using areas. Construction is one market where the seasonal decline is expected to cut into sales. Although some new orders for plate and structurals reflect the inventory bottom has been reached.

It now looks like steel operations will hover in the 50's (as a per cent of capacity) for some time. Few of the major steel consuming industries are likely to experience the kind of business improvement that would mean a major rush of new orders of a size to affect operations significantly.

Auto Needs Not Clear—Automotive remains a question mark and will be until the new models are tested. Production is on the increase, although there has been little change in the automotive order volume over the past two months.

In the warehouse market, which is close to the broad range of steel users, there is little encouragement. Some recent reports of increased orders for large tonnage can be discounted. Orders continue to run less than 1000 lb per order in most areas and warehouse price cuts are frequent.

Scrap Market Weaker — The scrap market continues to weaken. Prices, which a week ago approached a six-year low, continue to sag to 1954 levels.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,556	1,522	1,510	368
Ingot Index				
(1947-1949=100)	96.9	94.7	94.0	22.9
Operating Rates				
North East Coast	63.0	66.0*	58.0	12.0†
Buffalo	49.0	18.0*	59.0	0.0†
Pittsburgh	45.0	46.0*	42.0	29.0†
Youngstown	46.0	46.0*	43.0	10.0†
Cleveland	53.0	59.0	48.0	0.0†
Detroit	71.0	71.0*	71.0	25.0†
Chicago	59.0	58.0*	62.0	5.0†
Cincinnati	62.0	62.0	57.0	72.0†
St. Louis	80.0	82.0*	75.0	95.0†
South	53.0	45.0*	45.0	12.0†
West	53.0	54.0*	53.0	0.0†
U. S. Rate	54.6	53.4	53.0	13.0

*Revised †IRON AGE Estimates

Source: American Iron and Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.41	$66.41	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$29.83	$29.83	$31.83	$44.50
No. 2 bundles	$20.17	$20.17	$23.17	$30.17
Nonferrous				
Aluminum ingot	26.00	26.00	26.00	26.80
Copper, electrolytic	33.00	33.00	33.00	30-31.5
Lead, St. Louis	11.80	11.80	11.80	12.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	103.75	102.875	102.375	102.125
Zinc, E. St. Louis	13.00	13.00	13.00	12.00

Traffic, Buying Go Hand in Hand

J. A. Schilpp, H. K. Porter Co., Inc., says buying traffic is an important purchasing job.

And sound traffic management can mean big savings for your company.

- Should purchasing and traffic functions be combined under one head?

J. A. Schilpp feels they should. Director of purchases and traffic for the Refractories Div., H. K. Porter Co., Inc., Mr. Schilpp points out that transportation is one of the most important commodities a company buys.

This has certainly been true in the case of the Porter refractories group. It buys chrome ore from the Philippines, zircon sand from Australia, bauxite from South America. Freight charges are half the cost of dolemite, an important raw material for refractories.

New Traffic Problems — Moreover, the company has been expanding its refractory operation and, at the same time, has been consolidating the purchasing for the 15 plants that make refractories. All this has posed special traffic problems.

Mr. Schilpp is well equipped to deal with these problems. He has had long experience in traffic work —with the New York Central Railroad, Kaiser Aluminum & Chemical and other companies. He was traffic manager for the Porter refractories division before he moved up in 1958 as head of the overall purchasing-traffic department.

This background has come in handy the last few years. For its recently completed basic brick plant, Porter chose Pascagoula, Miss. as a production site. To compete in the big steelmaking markets, the plant had to open up fast, efficient transportation lines to the north.

J. A. SCHILPP: Transportation is an important commodity.

Tariff Maze—A major technical difficulty for the plant was the fact that no prior tariffs had been established for refractory shipments from south to north. This plunged Mr. Schilpp into a traffic maze that still occupies his time.

Even more important for a period of freight equalization and fast delivery, transportation had to be as efficient as possible. Porter's Pascagoula plant had to compete in Pittsburgh with plants that were 400 miles closer.

Water Route—As one answer to this difficulty, barge shipments were tried from the Mississippi site. Prior to this time, the general feeling had been that the motion of waterway travel would damage bricks. According to Mr. Schilpp, barge shipments have ridden very well, with no special packing. And use of the waterways has reduced freight charges to Pittsburgh by more than $2 a ton.

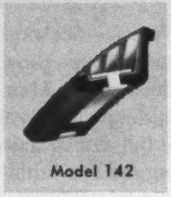
Numerous traffic questions have arisen in developing sources of supply for the Mississippi plant. Mr. Schilpp's experienced eye has been able to spot cases where delivered prices have reflected excessive freight charges. His knowledge of traffic has helped generally in providing multiple sources at minimum delivered cost.

In its deliveries to refractory users, Porter works with practically no lead times. On the other hand, the company must figure far ahead for its own raw materials.

This means a quick change in the market can leave a refractory plant with heavy raw material stocks on order or in transit.

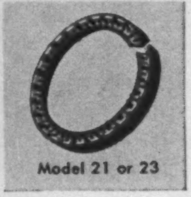
ENGINEERED OIL SEALS for Steel Mills

Model 64



Model 142

Model 53



Model 21 or 23

FULL BEARING PROTECTION IN SEVEREST ATMOSPHERES

Everywhere in steel—on hot and cold strip mills, blooming and structural mills—Garlock KLOZURE* Oil Seals prevent leakage of vital bearing lubrication. And they further prevent damage to the bearings by sealing out scale, spray, dirt, and other foreign matter.

For example, Model 142, a face-type KLOZURE, is designed to seal surfaces perpendicular to shaft . . . keeps water splash and scale out of bearings at the shoulder of mill rolls. Models 64 and 82 are applied to large shafts at normal or high speeds . . . ideal for protecting bearings on back-up and work rolls. Model 53 withstands temperatures up to 250°F at normal or high speeds . . . recommended for table rolls. Where equipment can't be dismantled easily, Models 21 or 23 Split-KLOZURES are the choice.

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Sealing Element, case, spring, and adapter on KLOZURES are designed for peak efficiency and durability. Garlock, with 70 years' experience and modern production facilities, manufactures KLOZURE Oil Seals in proper design and to extremely accurate dimensions from materials which are best suited for your application. Engineering skill, vast experience, and mass production know-how bring you the finest oil and grease seals available.

Obtain more information by calling the nearest of Garlock's 26 sales offices and warehouses throughout the U.S. and Canada. Or, write for KLOZURE Catalog 30. Garlock Inc., Palmyra, N.Y.

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Orders Undergo Ups and Downs

Steel orders are showing both gains and losses, depending on the product.

These changes will have little immediate effect on delivery promises or mill operations.

▪ Steel producers are talking about small improvements in the order situation. But they're having a hard time pinpointing the gains.

For one thing, while orders for some products are going up, others are showing declines. The ups and downs are mostly seasonal, with the gains smaller than usual. In addition, the net increase—if any—is not expected to significantly change operating levels at most mills. And certainly it won't cause delivery promises to stretch out during the next few weeks.

All products are easy, and customers continue to take advantage of this by holding back on orders until just before the material is needed. Ability to deliver fast is still netting some mills additional orders.

Sheet and Strip—Sponginess is beginning to creep into this area of the market. Steelmakers have been banking heavily on large automotive orders for fall production to get the industry moving upwards. It isn't happening. The auto industry and its suppliers are still the main source of business, but it is well below expectations. In addition, setbacks and outright cancellations continue.

The sheet picture "offers no cause for rejoicing," according to a **Pittsburgh** mill. The current month is running only about 5 pct better than September, pegging the mill's sheet operations at about 65 pct to 70 pct of capacity. Buying is balanced against production needs. Small gains recorded so far for flat-rolled products are due to general users, rather than automotive.

A similar situation exists in **Cleveland** where mills continue to receive setbacks. Best explanation seems to be that automakers are trying to gage the market for new cars before scheduling production. Flat-rolled products are showing softness in **Chicago.** Producers report little change from September, but have hopes for a noticeable increase in November business. They're holding back on predictions, however. For one thing, tonnage orders for November delivery are slow in coming.

Coated Products — Plastic and enamel-coated coils will soon be available in widths up to 60 in., according to a leading manufacturer of coating lines. Coatings include enamel paint plus heavy vinyl coating, vinyl laminate, and polyester laminate. Coated metals have been attracting increasingly wide interest in the past few years as quality goes up and prices decrease. An example is the relatively new one-coat enameling sheet (see p. 51).

Bars—A mild improvement has been noticed in the **Midwest,** but it still isn't enough to bring about an improvement in operations. Light commercial construction is going along fairly well in **Cleveland,** aiding sales of reinforcing bars. But the construction season is rapidly drawing to a close. Cold-finished bars are chalking up slight gains for **Chicago** warehouses, but mills haven't noticed significant gains. In addition, some warehouses are still reducing bar stocks. There has been an upturn in hot-rolled bar mill activity.

Plates and Shapes — Demand continues weak, but there is a little more forward ordering taking place in **Pittsburgh.** However, most ordering is on a spot basis for quick delivery. Prospects for light plate for linepipe are dismal; the August spurt has died out. Plate is about the weakest item on the list in **Chicago,** despite a mild flurry of orders from freight car builders. Failure of linepipe projects to materialize in the volume anticipated has also slowed operations.

Wire — Seasonal increases and decreases are showing up in the product mix. Manufacturers wire is holding its own for a **Pittsburgh** mill, but construction products are falling off. A similar situation is apparent in **Cleveland** where welded wire fabric is closing out its season, but there has been some increase in auto-type production. Mills are only operating at about 50 pct of capacity, and they're able to offer less-than-a-week delivery in many cases. And few buyers are allowing much more than that before placing orders.

Pipe and Tubing — Tubing specialties orders last month were the best since February, and up about 20 pct from August, reports a **Pittsburgh** producer. Demand from Europe and South America has increased, reflecting a tight supply situation abroad where delivery promises are 9 to 12 months.

PURCHASING AGENT'S CHECKLIST

Steel industry capacity includes high-cost, marginal units. Operating these may be impractical, even in peak demand periods. P. 50

Buying interest increases in one-coat enamel sheet. P. 51

Planned program can reduce grinding costs. P. 88

COMPARISON OF PRICES

(Effective Oct. 11, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Oct. 11 1960	Oct. 4 1960	Sept. 13 1960	Oct. 13 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Oct. 11 1960	Oct. 4 1960	Sept. 13 1960	Oct. 13 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.57
Foundry, South Cin'ti.	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$29.50	$29.50	$31.50	$46.50
No. 1 steel, Phila. area	33.50	33.50	34.50	44.50
No. 1 steel, Chicago	26.50	26.50	29.50	42.50
No. 1 bundles, Detroit	25.50*	26.50	28.50	39.50
Low phos., Youngstown	32.00*	33.00	35.50	47.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	47.50	53.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	53.50
No. 1 mach'y cast, Chicago	41.50	41.50	45.50	63.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$29.83	$29.83	$31.83	$44.50
No. 2 bundles	20.17	20.17	23.17	30.17
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	30-31.50
Copper, Lake, Conn.	33.00	33.00	33.00	31.50
Tin, Straits, N. Y.	103.75†	102.075	102.375	102.125
Zinc, East St. Louis	13.00	13.00	13.00	12.00
Lead, St. Louis	11.80	11.80	11.80	12.80
Aluminum, ingot	26.00	26.00	26.00	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. **Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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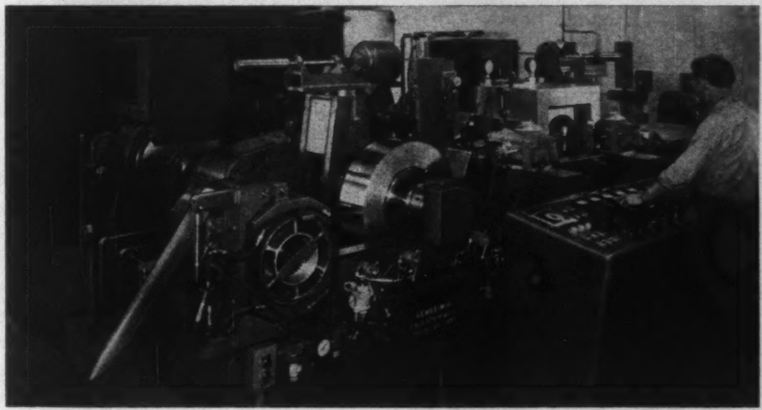

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No Sign of Upturn In Dull Market

More declines have the market in a demoralized condition. Buys are few and resistance strong.

Although no early recovery is expected, prices have reached the level where they will dry up sources.

▪ Falling scrap prices spread this week as teetering markets followed the general downtrend.

New York, Boston, Detroit and Cleveland all declined this week. The market is at a six-year low and appears to be demoralized.

Most mills are out of the dealer market entirely, with home scrap and industrial lists supplying their meager needs. Mills that might be expected to buy are waiting for even lower prices.

The feeling is that there won't be an upswing of any size during the fourth quarter. The steel market is depressed and large purchases of scrap are not likely until steel operations improve.

The IRON AGE No. 1 heavy melting composite remained unchanged at $29.83, lowest level since 1954.

Pittsburgh—Early railroad lists show even more price weakness. No. 1 railroad heavy melting was down $4 from last month on one list and railroad specialties were off $7. While these developments reflect the general market condition, they brought no changes in dealer openhearth grades. Brokers say prices of these grades can't go much lower without stopping the flow of scrap completely. Attempts by a nearby mill to buy No. 2 bundles for less than $25 resulted in some tonnage but quickly met dealer resistance.

Chicago — The market steadied slightly after the violent breaks of the past two weeks. Fresh purchases in foundry grades pegged the prices at current levels, with some lots actually moving above the quoted price. Nevertheless, it is still the feeling that more price drops will soon come. Inventories are rated very high and railroads, last week, began dumping several items at the lowest prices paid this year.

Philadelphia — Prices are unchanged. Domestic business is so slow it's hard to establish any price pattern. Export activity is still on the easy side, but there is enough around to keep dealers optimistic. Little price change is expected in the near future.

New York—The teetering prices of last week have dropped. Almost all steelmaking and blast furnace grades are down $1 to $2. Export buyers, apparently noting the sag in other U. S. markets, applied the pressure for lower prices and got them. Now, dealers are wondering if buyers will be satisfied at current levels. Export demand is still down sharply.

Detroit — Confidence and prices are declining. Domestic mill demand is zero and overseas exporters have stopped buying. However, Canadians are showing a little interest in such grades as heavy melting, bushelings, and flashings. Prices are too high to attract speculators who may be interested in laying down scrap for the winter. Further price drops are expected.

Cleveland — The market continued its decline as prices dropped another $1. Dealers are unable to move any tonnage and the outlook grows weaker. Prime scrap is being shipped on old orders, and continues to overhang the market.

Cincinnati—Lack of orders for the second straight month has many dealers anxious to sell, but only a small amount of tonnage is moving. A lone mill in the market is getting top grades. The upriver market is also dead.

St. Louis—The market remains dull and depressed. Mill buying is very selective and purchases are for small amounts. There is just no demand. The general feeling is that the market will continue soft for quite some time.

Birmingham — An Atlanta mill purchased No. 2 heavy melting scrap this week and an Alabama openhearth consumer made some purchases. Cast buyers have just about filled their needs for the month.

Buffalo — With the rail strike ended, small purchases of No. 1 heavy melting and No. 2 bundles were made at quoted prices. All other prices remain unchanged. Dealers are not expecting any radical market changes in the near future.

Boston—All prices are down $1 on the appraisal of a weakening market and in sympathy with lower prices in adjacent markets. There are no new sales and virtually no movement of scrap in the district.

West Coast — Prices continue soft. Some dealers believe the outlook for November and December is bleak. A $2 to $3 drop is considered possible for top steelmaking grades.

Houston — The market is dull and full of apprehension. Exports are off with reports that Mexico's biggest consumer of American scrap is out of the market for the rest of the year.

SCRAP PRICES *(Effective Oct. 11, 1960)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	30.00 to 31.00
No. 1 factory bundles	35.00 to 36.00
No. 2 bundles	23.00 to 24.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	17.00 to 18.00
Low phos. punch'gs plate	36.00 to 37.00
Heavy turnings	25.00 to 26.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth.	43.00 to 44.00
Rails 2 ft. and under	48.00 to 49.00
RR specialties	39.00 to 40.00
No. 1 machinery cast	45.00 to 46.00
Cupola cast	35.00 to 36.00
Heavy breakable cast	33.00 to 34.00
Stainless	
18-8 bundles and solids	185.00 to 190.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	90.00 to 95.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy melting	24.00 to 25.00
No. 1 dealer bundles	27.00 to 28.00
No. 1 factory bundles	31.00 to 32.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	26.00 to 28.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Low phos. forge crops	36.00 to 37.00
Low phos, punch'gs plate, ¼ in. and heavier	32.00 to 33.00
Low phos. 2 ft. and under	30.00 to 31.00
No. 1 RR hvy. melting	31.00 to 32.00
Scrap rails, random lgth.	38.00 to 39.00
Rerolling rails	48.00 to 50.00
Rails 2 ft. and under	42.00 to 43.00
Angles and splice bars	39.00 to 40.00
RR steel car axles	47.00 to 48.00
RR couplers and knuckles	36.00 to 37.00
No. 1 machinery cast.	41.00 to 42.00
Cupola cast.	36.00 to 37.00
Cast iron wheel	27.00 to 28.00
Malleable	40.00 to 41.00
Stove plate	30.00 to 31.00
Steel car wheels	35.00 to 36.00
Stainless	
18-8 bundles and solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 bundles and solids	80.00 to 85.00
430 turnings	40.00 to 45.00

Philadelphia Area

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	14.00 to 15.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	20.00 to 21.00
Clean cast. chem. borings	23.00 to 24.00
Low phos. 5 ft and under	37.00 to 38.00
Low phos. 2 ft punch'gs	39.00 to 40.00
Elec. furnace bundles	36.00 to 37.00
Heavy turnings	27.00 to 28.00
RR specialties	39.00 to 40.00
Rails, 18 in. and under	50.00 to 51.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	37.00 to 38.00
Cast iron car wheels	40.00 to 41.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$24.00 to $25.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	16.00 to 17.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Low phos. 18 in. and under	33.00 to 34.00
Rails, random length	39.00 to 40.00
Rails, 18 in. and under	46.00 to 47.00
No. 1 cupola cast	35.00 to 36.00
Hvy. breakable cast.	30.00 to 31.00
Drop broken cast.	45.00 to 46.00

Youngstown

No. 1 hvy. melting	$29.50 to $30.50
No. 2 hvy. melting	22.50 to 23.50
No. 1 dealer bundles	29.50 to 30.50
No. 2 bundles	19.50 to 20.50
Machine shop turn.	14.50 to 15.50
Shoveling turnings	16.50 to 17.50
Low phos. plate	31.50 to 32.50

Cleveland

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	18.50 to 19.50
No. 1 dealer bundles	27.00 to 28.00
No. 1 factory bundles	30.00 to 31.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	27.00 to 28.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Cut structural & plates, 2 ft. & under	32.00 to 33.00
Low phos. punch'gs plate	28.00 to 29.00
Drop forge flashings	27.00 to 28.00
Foundry steel, 2 ft. & under	31.00 to 32.00
No. 1 RR hvy. melting	31.00 to 32.00
Rails 2 ft. and under	47.00 to 48.00
Rails 18 in. and under	48.00 to 49.00
Steel axle turnings	22.00 to 23.00
Railroad cast.	45.00 to 46.00
No. 1 machinery cast.	48.00 to 49.00
Stove plate	37.00 to 38.00
Malleable	43.00 to 44.00
Stainless	
18-8 bundles	180.00 to 185.00
18-8 turnings	75.00 to 80.00
430 bundles	80.00 to 85.00

Buffalo

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 busheling	27.00 to 28.00
No. 1 dealer bundles	27.00 to 28.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	13.00 to 14.00
Low phos. plate	34.00 to 35.00
Structurals and plate, 2 ft. and under	36.00 to 37.00
Scrap rails, random lgth.	35.00 to 36.00
Rails 2 ft. and under	45.00 to 46.00
No. 1 machinery cast.	45.00 to 46.00
No. 1 cupola cast.	39.00 to 40.00

St. Louis

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	26.00 to 27.00
Foundry steel, 2 ft.	28.00 to 29.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	19.00 to 20.00
No. 1 RR hvy. melting	30.00 to 31.00
Rails, random lengths	36.00 to 37.00
Rails, 18 in. and under	38.00 to 39.00
RR specialties	37.00 to 38.00
Cupola cast.	42.00 to 43.00
Heavy breakable cast.	34.00 to 35.00
Stove plate	35.00 to 36.00
Cast iron car wheels	34.00 to 35.00
Rerolling rails	49.00 to 50.00
Unstripped motor blocks	35.00 to 36.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	28.00 to 29.00
Machine shop turn.	17.00 to 18.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	10.00 to 11.00
Electric furnace bundles	31.00 to 32.00
Elec. furnace, 3 ft. & under	34.00 to 35.00
Bar crops and plate	38.00 to 49.00
Structural and plate, 2 ft.	37.00 to 38.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rail, random lgth.	38.00 to 39.00
Rails, 18 in. and under	44.00 to 45.00
Angles and splice bars	38.00 to 39.00
No. 1 cupola cast.	46.00 to 47.00
Stove plate	46.00 to 47.00
Cast iron car wheels	36.00 to 37.00
Unstripped motor blocks	34.00 to 35.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	20.00 to 21.00
No. 2 dealer bundles	15.00 to 16.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Clean cast. chem. borings	18.00 to 19.00
No. 1 machinery cast.	37.00 to 38.00
Mixed yard cast.	33.00 to 34.00
Heavy breakable cast.	31.00 to 32.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	17.00 to 18.00
No. 1 dealer bundles	25.00 to 26.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	22.00 to 23.00
Drop forge flashings	22.00 to 23.00
Machine shop turn.	8.00 to 9.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Heavy breakable cast.	26.00 to 27.00
Mixed cupola cast.	32.00 to 33.00
Automotive cast.	38.00 to 39.00
Stainless	
18-8 bundles and solids	160.00 to 165.00
18-8 turnings	50.00 to 55.00
430 bundles and solids	55.00 to 60.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	13.00 to 14.00
No. 1 busheling	23.00 to 24.00
Machine shop turn.	4.00 to 5.00
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	11.00 to 12.00
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	31.00 to 32.00
Heavy breakable cast.	26.50 to 27.50

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	$27.00 to 28.00
No. 2 bundles	18.00
Machine shop turn.	14.00
Cast iron borings	14.00
No. 1 cupola cast.	45.00

Los Angeles

No. 1 hvy. melting	$30.00
No. 2 hvy. melting	27.00
No. 1 dealer bundles	25.00
No. 2 bundles	17.00
Machine shop turn.	12.00
Shoveling turnings	13.00
Cast iron borings	13.00
Elec. furnace 1 ft. and under (foundry)	41.00
No. 1 cupola cast.	39.00 to 40.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	31.00
No. 2 bundles	21.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$25.80
No. 2 hvy. melting cut 3 ft. and under	22.50
No. 1 dealer bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Bush., new fact., prep'd	25.50
Bush., new fact., unprep'd	20.45
Machine shop turn.	10.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	33.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	30.00
No. 2 bundles	20.50
Machine shop turn.	12.00
Shoveling turnings	14.00
Cut structural plate 2 ft. & under	$38.00 to 39.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast.	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00

Copper Producers Hold at 33¢

In spite of custom smelter price cuts, copper producers are determined to keep price at 33¢.

It's a test of major producers' determination to build image of stability.

- The pressure is building up on the U. S. producers' copper price. As of now, the major producers are still holding the 33¢ per lb line set back in November 1959.

The biggest factor is that copper fabricators and mills are being forced to shade prices in the face of wishy-washy markets and very sharp competition. They are bringing heavy pressure on producers to bring their price down.

Smelters Drop—On top of that, all other world copper sources are selling at less than U. S. producers. Custom smelters dropped last week 2¢ per lb to 31¢ after holding their price since March. At the latest report, the lower custom smelter price was not bringing in any more business.

Despite problems in Africa and a strike in Chile, there is an oversupply of copper. And just to complicate things, one of the biggest U. S. copper consumers, General Electric Corp., is temporarily out of the market.

Stability Sought—At issue is market stability. The producers in the last year have decided that, above all else, they must establish the image of stability in copper markets. They have set a policy of resisting shifting trends in world market.

An informal goal was to hold the copper price unchanged through all of 1960. If the pressure gets too great, it could hurt copper's stable markets program.

The major problem is that the issue is not likely to reach a crisis quickly. Right now, many copper users are starting to write off the rest of 1960 in terms of any solid pickup in business.

Fourth Quarter Gloomy — That means they won't be buying any greater amounts of copper until 1961 at the earliest.

Copper producers have repeatedly said that a lower price will not stimulate sales. Buyers only wait for it to go lower in their anxiety to buy at the bottom, they contend.

But the question is, can they stand up to two to four months of growing pressure from customers for a lower price?

Aluminum

The first appraisal by one of the major aluminum producers of the 1961 auto market comes from V. E. Flaherty, Kaiser Aluminum's automotive industry manager. And, as usual, it's optimistic.

Mr. Flaherty figures the average 1961 car will use 14.2 pct more aluminum than the 1960 models. "This follows an historic trend established during the past decade of annual increases of from 10 to 15 pct," he noted.

The average net, or finished weight of aluminum components on 1961 cars will be about 62.1 lb. The total for 1960 averages to 54.4 lb per car.

This would put net use of aluminum by the auto industry at about 379 million lb, figuring production of about six million 1961 units.

The cars with new aluminum engines will be the big users of aluminum, averaging 106 to 134 lb per car, figures Mr. Flaherty.

Brass

"Imports of brass mill products in 1959 reached an annual volume of 199 million lb. This represents the work of about 2500 mill production workers for a full year."

This is what T. E. Veltfort, managing director of the Copper and Brass Research Assn., told the Eastern Plant Management Conference of the National Metal Trades Assn. meeting.

What can be done about the inroads of imports to the U. S. brass mills? In addition to the need for constant improvement of products and processes, cutting production costs, and trimming prices where possible, Mr. Veltfort called for "a complete reappraisal of our national policies with respect to our foreign trade."

Tin prices for the week: Oct. 5—103.125; Oct. 6—103.375; Oct. 7—103.50; Oct. 10—103.75; Oct. 11—103.875*.

* Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	33.00	30-33	11/12/59
Copper (CS)	31.00	33.00	10/3/60
Copper (L)	33.00	31.50	11/6/59
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium Ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	160-160	182-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig Velasco, Tex. **NICKEL:** Port Colborne, Canada. **ZINC:** prime western. **TIN:** See above; Other primary prices, pg. 142.

THE INSIDE STORY

ROEBLING
ROYAL-1105-BLUE

ROYAL BLUE—*we put a lot of work into it—You get a lot of work out of it.*

ROEBLING ROYAL BLUE WIRE ROPE This is rather a long view of a wire rope that's a real work horse. Time and tests have taught us at Roebling that wire rope users *want* the long view. What else, they say, are they spending their money for?

Here, you're looking through a length of Royal Blue whose core has been removed to show the uniformity and symmetry of the rope structure. You see how concerned we are with internal security.

This is one of the reasons why Royal Blue lives up to the day-to-day demands made upon it. High stresses and unavoidable overloads, abrasion, fatigue, impact, crushing, sheave pressures and abusive drum-winding, to name the major ones.

We have to know that the rope we build will do what we sell it to do. Numerous quality-control measures help us—as they do you—to take the long view of Royal Blue. For details about long-lasting Roebling Royal Blue, ask your wire rope distributor or write Roebling's Wire Rope Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities • John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.6	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-11/16	13/32-11/2
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand, Grade	......	67.9	69.0	77.9	103.1
AZ31B Spec.	......	93.3	96.9	108.7	171.3
Tread Plate	......	70.6	71.7	......	......
Tooling Plate	73.0	......	......	......	......

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)	37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting)	40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	57.13	....	54.86	58.32
Brass, Yellow	50.57	50.86	50.26	54.23
Brass, Low	53.53	53.82	53.22	57.09
Brass, R L	54.58	54.87	54.27	58.14
Brass, Naval	55.12	....	48.68	58.78
Munts Metal	53.20	....	48.26	....
Momm. Bz.	56.17	56.46	55.86	59.48
Mang. Bz.	58.86	....	52.21	....
Phos. Bz. 5%	77.44	....	78.10	....

Free Cutting Brass Rod 36.06

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.	29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be	$65.00
Beryllium copper, per lb conta'd Be	$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading	$70.00
Bismuth, ton lots	$ 2.25
Cadmium, del'd	$ 1.50
Calcium, 99.9% small lots	$ 4.55
Chromium, 99.8% metallic base	$ 1.31
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Germanium, per gm, f.o.b. Miami, Okla., refined	$29.95 to $36.95
Gold, U. S. Treas., per troy oz.	$35.00
Indium, 99.9%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$75 to $85
Lithium, 98%	$9.00 to $12.00
Magnesium sticks, 10,000 lb.	57.00
Mercury, dollars per 76-lb flask f.o.b. New York	$208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel	69.60
Palladium, dollars per troy oz.	$24 to $26
Platinum, dollars per troy oz.	$82 to $85
Rhodium	$137 to $140
Silver ingots (¢ per troy oz.)	91.375
Thorium, per kg.	$43.00
Vanadium	$ 3.65
Zirconium sponge	$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot	
No. 115	29.25
No. 120	28.25
No. 123	27.25
80-10-10 ingot	
No. 305	33.75
No. 315	31.50
88-10-2 ingot	
No. 210	42.00
No. 215	38.75
No. 245	34.00
Yellow ingot	
No. 405	23.75
Manganese bronze	
No. 421	28.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper max.	24.25-24.50
0.60 copper max.	24.00-24.25
Piston alloys (No. 132 type)	26.00-27.00
No. 12 alum. (No. 2 grade)	22.75-23.25
108 alloy	23.25-23.75
195 alloy	25.75-26.75
13 alloy (0.60 copper max.)	24.00-24.25
AXS-679 (1 pct zinc)	23.00-24.00

(Effective Oct. 11, 1960)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½%	23.75-24.75
Grade 2—92-95%	22.50-23.50
Grade 3—90-92%	21.50-22.50
Grade 4—85-90%	21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	22¼	20¼
Red brass	25¾	25
Comm. bronze	26½	26
Mang. bronze	20¾	20
Free cutting rod ends.	21¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	25½
No. 2 copper wire	23½
Light copper	21¼
*Refining brass	21½
Copper bearing material	20

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24¾
No. 2 copper wire	23¼
Light copper	21
No. 1 composition	20¼
No. 1 comp. turnings	14¾
Hvy. yellow brass solids	15½
Brass pipe	14
Radiators	16¼

Aluminum

Mixed old cast.	13 —13½
Mixed new clips	14½—15
Mixed turnings, dry	13½—14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	22½—23
No. 2 copper wire	20½—21
Light copper	18½—19
Auto radiators (unsweated)	12¾—13¼
No. 1 composition	17 —17½
No. 1 composition turnings	15¾—16¼
Cocks and faucets	13¼—13¾
Clean heavy yellow brass	12¼—12¾
Brass pipe	13¾—14¼
New soft brass clippings	14 —14¼
No. 1 brass rod turnings	12¾—13¼

Aluminum

Alum. pistons and struts	6½— 7
Aluminum crankcase	8½— 9
1100 (2s) aluminum clippings	10 —10½
Old sheet and utensils	8½— 9
Borings and turnings	4½— 5
Industrial castings	9 — 9½
2020 (24s) clippings	10 —10½

Zinc

New zinc clippings	7 — 7¼
Old zinc	4 — 4½
Zinc routings	3 — 3¼
Old die cast scrap	.2 — 2¼

Nickel and Monel

Pure nickel clippings	52-54
Clean nickel turnings	40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	23-23.50
Clean Monel turnings	16.50-17
Old sheet Monel	22-23
Nickel silver clippings, mixed	18
Nickel silver turnings, mixed.	15

Lead

Soft scrap lead	8 — 8¼
Battery plates (dry)	3 — 3¼
Batteries, acid free	2 — 2¼

Miscellaneous

Block tin	79 —80
No. 1 pewter	59 —60
Auto babbitt	43 —44
Mixed common babbitt	10¼—10¾
Solder joints	14½—15
Siphon tops	41
Small foundry type	9¾—10¼
Monotype	9¾—10¼
Lino. and stereotype	8¾— 9
Electrotype	7½— 7¾
Hand picked type shells	5¼— 5¾
Lino. and stereo. dross	2¼— 2¾
Electro dross	2¼— 2¾

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	**Bethlehem, Pa.**			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Castle, Pa.									7.425* *M10*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. **Worcester, Mass.**									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	**Alton, Ill.**								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio **Sharon, Pa.**		$99.50 *S1; C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	**Fontana, Cal.**	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	**Atlanta, Ga.**					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Oct. 10, 1960)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Holloware Enameling *29* ga.
EAST	**Buffalo, N. Y.**	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	**Alton, Ill.**									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*, R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	**Fontana, Cal.**	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Terrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	**Atlanta, Ga.**												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

? Electrogalvanized sheets.

(Effective Oct. 10, 1960)

***7.425 at Sharon-Niles is 7.225**

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Oct. 10, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1	Acme Steel Co., Chicago
A2	Alan Wood Steel Co., Conshohocken, Pa.
A3	Allegheny Ludlum Steel Corp., Pittsburgh
A4	American Cladmetals Co., Carnegie, Pa.
A5	American Steel & Wire Div., Cleveland
A6	Angel Nail & Chaplet Co., Cleveland
A7	Armco Steel Corp., Middletown, Ohio
A8	Atlantic Steel Co., Atlanta, Ga.
A9	Acme-Newport Steel Co., Newport, Ky.
A10	Alaska Steel Mills, Inc., Seattle, Wash.
B1	Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2	Bethlehem Steel Co., Pacific Coast Div.
B3	Bethlehem Steel Co., Bethlehem, Pa.
B4	Blair Strip Steel Co., New Castle, Pa.
B5	Bliss & Laughlin, Inc., Harvey, Ill.
B6	Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7	A. M. Byers, Pittsburgh
B8	Braeburn Alloy Steel Corp., Braeburn, Pa.
C1	Calstrip Steel Corp., Los Angeles
C2	Carpenter Steel Co., Reading, Pa.
C4	Claymont Products Dept., Claymont, Del.
C6	Colorado Fuel & Iron Corp., Denver
C7	Columbia Geneva Steel Div., San Francisco
C8	Columbia Steel & Shafting Co., Pittsburgh
C9	Continental Steel Corp., Kokomo, Ind.
C10	Copperweld Steel Co., Pittsburgh, Pa.
C11	Crucible Steel Co. of America, Pittsburgh
C13	Cuyahoga Steel & Wire Co., Cleveland
C14	Compressed Steel Shafting Co., Readville, Mass.
C15	G. O. Carlson, Inc., Thorndale, Pa.
C16	Connors Steel Div., Birmingham
C18	Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.
D1	Detroit Steel Corp., Detroit
D2	Driver, Wilbur B., Co., Newark, N. J.
D3	Driver Harris Co., Harrison, N. J.
D4	Dickson Weatherproof Nail Co., Evanston, Ill.
E1	Eastern Stainless Steel Corp., Baltimore
E2	Empire-Reeves Steel Corp., Mansfield, O.
E3	Enamel Products & Plating Co., McKeesport, Pa.
F1	Firth Sterling, Inc., McKeesport, Pa.
F2	Fitzsimons Steel Corp., Youngstown
F3	Follansbee Steel Corp., Follansbee, W. Va.
G2	Granite City Steel Co., Granite City, Ill.
G3	Great Lakes Steel Corp., Detroit
G4	Greer Steel Co., Dover, O.
G5	Green River Steel Corp., Owenboro, Ky.
H1	Hanna Furnace Corp., Detroit
I2	Ingersoll Steel Div., New Castle, Ind.
I3	Inland Steel Co., Chicago, Ill.
I4	Interlake Iron Corp., Cleveland
J1	Jackson Iron & Steel Co., Jackson, O.
J2	Jessop Steel Corp., Washington, Pa.
J3	Jones & Laughlin Steel Corp., Pittsburgh
J4	Joslyn Mfg. & Supply Co., Chicago
J5	Judson Steel Corp., Emeryville, Calif.
K1	Kaiser Steel Corp., Fontana, Calif.
K2	Keystone Steel & Wire Co., Peoria
K4	Keystone Drawn Steel Co., Spring City, Pa.
L1	Laclede Steel Co., St. Louis
L2	La Salle Steel Co., Chicago
L3	Lone Star Steel Co., Dallas
L4	Lukens Steel Co., Coatesville, Pa.
M1	Mahoning Valley Steel Co., Niles, O.
M2	McLouth Steel Corp., Detroit
M3	Mercer Tube & Mfg. Co., Sharon, Pa.
M4	Mid States Steel & Wire Co., Crawfordsville, Ind.
M7	Milton Steel Products Div., Milton, Pa.
M8	Mill Strip Products Co., Evanston, Ill.
M9	Moltrup Steel Products Co., Beaver Falls, Pa.
M10	Mill Strip Products Co., of Pa., New Castle, Pa.
N1	National Supply Co., Pittsburgh
N2	National Tube Div., Pittsburgh
N4	Northwestern Steel & Wire Co., Sterling, Ill.
N6	Northwest Steel Rolling Mills, Seattle
N7	Newman Crosby Steel Co., Pawtucket, R. I.
N8	Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9	Nelson Steel & Wire Co.
O1	Oliver Iron & Steel Co., Pittsburgh
O2	Oregon Steel Mills, Portland
P1	Page Steel & Wire Div., Monessen, Pa.
P2	Phoenix Steel Corp., Phoenixville, Pa.
P3	Pilgrim Drawn Steel Div., Plymouth, Mich.
P4	Pittsburgh Coke & Chemical Co., Pittsburgh
P6	Pittsburgh Steel Co., Pittsburgh
P7	Portsmouth Div., Detroit Steel Corp., Detroit
P8	Plymouth Steel Co., Detroit
P9	Pacific States Steel Co., Niles, Cal.
P10	Precision Drawn Steel Co., Camden, N. J.
P11	Production Steel Strip Corp., Detroit
P13	Phoenix Mfg. Co., Joliet, Ill.
P14	Pacific Tube Co.
P15	Philadelphia Steel and Wire Corp.
R1	Reeves Steel & Mfg. Div., Dover, O.
R2	Reliance Div., Eaton Mfg. Co., Massillon, O.
R3	Republic Steel Corp., Cleveland
R4	Roebling Sons Co., John A., Trenton, N. J.
R5	Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6	Rodney Metals, Inc., New Bedford, Mass.
R7	Rome Strip Steel Co., Rome, N. Y.
S1	Sharon Steel Corp., Sharon Pa.
S2	Sheffield Steel Div., Kansas City
S3	Shenango Furnace Co., Pittsburgh
S4	Simonds Saw and Steel Co., Fitchburg, Mass.
S5	Sweet's Steel Co., Williamsport, Pa.
S7	Stanley Works, New Britain, Conn.
S8	Superior Drawn Steel Co., Monaca, Pa.
S9	Superior Steel Div. of Copperweld Steel Co..
S10	Seneca Steel Service, Buffalo
S11	Southern Electric Steel Co., Birmingham
S12	Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13	Seymour Mfg. Co., Seymour, Conn.
S14	Screw and Bolt Corp. of America, Pittsburgh, Pa.
T1	Tonawanda Iron Div., N. Tonawanda, N. Y.
T2	Tennessee Coal & Iron Div., Fairfield
T3	Tennessee Products & Chem. Corp., Nashville
T4	Thomas Strip Div., Warren, O.
T5	Timken Steel & Tube Div., Canton, O.
T7	Texas Steel Co., Fort Worth
T8	Thompson Wire Co., Boston
U1	United States Steel Corp., Pittsburgh
U2	Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3	Ulbrich Stainless Steels, Wallingford, Conn.
U4	U. S. Pipe & Foundry Co., Birmingham
W1	Wallingford Steel Co., Wallingford, Conn.
W2	Washington Steel Corp., Washington, Pa.
W3	Weirton Steel Co., Weirton, W. Va.
W4	Wheatland Tube Co., Wheatland, Pa.
W5	Wheeling Steel Corp., Wheeling, W. Va.
W6	Wickwire Spencer Steel Div., Buffalo
W7	Wilson Steel & Wire Co., Chicago.
W8	Wisconsin Steel Div., S. Chicago, Ill.
W9	Woodward Iron Co., Woodward, Ala.
W10	Wyckoff Steel Co., Pittsburgh
W12	Wallace Barnes Steel Div., Bristol, Conn.
Y1	Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities		Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
	City Delivery‡ Charge	Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	....	....	....	....
Baltimore**	$.10	8.37	9.71	10.16	10.78	8.94	9.63	9.15	11.90	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	....	....	....
Boston**	.10	9.77	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.72	10.35	10.30	10.89	8.56	9.06	8.70	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.13	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	....	....	....	20.84
Detroit**	.15	8.98	10.61	10.65	11.26	8.93	9.62	9.01	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	10.03	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.59[1]	11.29	12.20	11.29	9.82	10.54	9.67	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.99	10.20	....	11.39	10.27	10.48	10.07	12.89	....	....	....	....
Milwaukee**	.15	8.86	10.49	10.44	11.03	8.70	9.28	8.84	11.04	17.24	16.24	21.24	20.49
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	....	....	8.90	8.65	9.20	8.90	10.70	....	....	....	....
Philadelphia**	.10	10.45	10.10	11.50	10.95	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.13	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	19.70	20.45
Portland**		10.20	12.05	12.35	12.20	10.35	10.80	10.20	16.65	18.50	17.45	20.75	20.25
San Francisco**	.10	10.27	11.79[2]	11.55	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.92	10.75	10.68	11.09	8.77	9.29	8.92	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.74	10.99	11.16	8.83	9.33	8.97	11.64	....	16.69	....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Oct. 10, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	....	....
Birmingham *W9*	62.00	62.50*	66.50	....	....
Birmingham *U4*	62.00	62.50*	66.50	....	....
Buffalo *R3*	66.00	66.50	67.00	67.50	....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	....
Chester *P2*	68.00	68.50	69.00	....	....
Chicago *I4*	66.00	66.50	66.50	67.00	....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	....	....	....
Geneva, Utah *C7*	66.00	66.50	....	....	....
Granite City *G2*	67.90	68.40	68.90	....	....
Hubbard *Y1*	....	....	66.50	....	....
Ironton, Utah *C7*	66.00	66.50	....	....	....
Lyles, Tenn. *T3*	....	....	....	....	73.00
Midland *C11*	66.00	....	....	....	....
Minnequa *C6*	68.00	68.50	69.00	....	....
Monessen *P6*	66.00	....	....	....	....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	....	66.50	67.00	67.50	....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	....	66.50	67.00	....
So. Chicago *R3*	66.00	66.50	66.50	67.00	....
So. Chicago *W8*	66.00	....	66.50	67.00	....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66-00	66.50	66.50	67.00	....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	....	....	66.50	....	....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)	
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Discount Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	43.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13*, (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1*, (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* wensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Discount Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Oct. 10, 1960)

MERCHANT WIRE PRODUCTS

• F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	...	...	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	...	...	.....	9.00	9.55
Chicago *W7*	173	.....	...	...	.....	9.00	9.55
Cleveland *A6*	.....	.....	...	...	.....	.....	.....
Cleveland *A5*	.....	.....	...	...	.....	9.00	.....
Crawf'dsv. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	...	...	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	...	...	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	...	...	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	.....	.....	...	236	.....	9.95	10.50
SparrowsPt. *B3***	175	.....	...	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	...	...	.....	8.65	9.20
Worcester *A5*	179	.....	...	...	.....	9.30	9.85
Williamsport *S5*	.....	.....	...	...	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	......	......	......	......	......	......	......	......
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	......	......	......	......	......	......	......	......
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50	......	......	......	......	......	......	......	......
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	......	......	......	......	......	......	......	......
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	......	......	......	......	......	......	......	......
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	......	......	......	......	......	......	......	......
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50	......	......	......	......	......	......	......	......
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	......	......	......	......	......	......	......	......
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	......	......	......	......	......	......	......	......
Fontana *K1*	*6.25	......	*2.25	......	0.75	......	1.25	......	1.75	......	2.25	......	2.75	......	......	......	......	......	......	......	......	......
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	......	......	......	......	......	......	......	......
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50	......	......	......	......	......	......	......	......
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.5
Chicago	139.8
San Francisco-L. A.	148.6

**Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.*

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

SCRAP HANDLING

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OWEN GRAPPLES

OWEN grapples act like a giant hand, with each finger or tine closing independently of the others. Because of this exclusive patented independent tine action, each tine does its full share... all four tines are always in contact with the material.

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No matter what material your product demands Mundt can supply the exact perforation you need. Steel, brass, copper, monel, bronze, aluminum, zinc, tinplate, lead, stainless steel, coated metals, bonded materials, plastics, and paper are punched as required for every functional and ornamental need.

You can count on Mundt's guarantee that sheets are perfectly flat, straight, parallel on the sides, and free from buckle or camber.

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PERFORATING SPECIALISTS FOR ALL TYPES OF MATERIALS

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C	41.00	0.50% C	32.75
0.05% C	33.50	1.00% C	32.50
0.10% C	33.25	1.50% C	32.25
0.20% C	33.00	2.00% C	32.00

4.00-4.50% C, 60-70% Cr, 1.2% Si	28.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si	28.25
0.25% C (Simplex)	31.50
5-7% C, 61-65% Cr, 5-8% Si	22.00
5% max C, 50-55% Cr, 2% max Si	25.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.

0.10% max. C	$1.29
9 to 11% C, 88-91% Cr, 0.75% Fe	1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	$1.15
Ton lots	1.17
Less ton lots	1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	24.50	14.60
Ton lots	29.75	16.05
Less ton lots	31.35	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads, bulk	24.00
Ton lots	27.95
Less ton lots	29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads, bulk	23.00
Ton lots	26.15
Less ton lots	27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	21.15
Less ton lots	22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	18.45
Ton lots	19.95
Less ton lots	21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload bulk	19.20
Ton lots to carload packed	21.15
Less ton lots	22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 75 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	13.70
Ton lots packed in bags	16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

	Palmerton, Pa.		Neville Is., Pa.
Mn	10 lb, pig	35 lb, down	35 lb
16-19%	$98.00	$96.00	$100.50
19-21%	100.00	98.00	102.50
21-23%	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads, bulk	34.25
Ton lots, palletized	36.25
250 to 1999 lb	39.00
Premium for Hydrogen - removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads (Bulk)	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.

Carloads bulk	11.60
Ton lots, packed	13.25
Carloads, bulk, delivered, per lb of briquet	14.00
Briquets, packed pallets, 2000 lb up to carloads	16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk	8.00
Ton lots, packed	10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si	14.60	75% Si	16.90
65% Si	15.75	85% Si	18.60
90% Si	20.00		

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.

Openhearth	3.20
Crucible	3.30
High speed steel	3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb.	2.40	3.30	4.55

(Effective Oct. 10, 1960)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads, bulk	9.85¢
Ton lots	11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, delivered per pound

Ton lots	$3.45
Less ton lots	3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo .. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage,

per gross ton	$120.00
10 tons to less carload	$131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots,

per lb contained Ti	$1.50
Less ton lots	$1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $255.00

Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered .... $2.15 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth, Pa.

Pa.	$1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa.	$1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy

35-40% del'd, carloads, bulk	26.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload	$5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound .... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.

Ton lots per pound	18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots... $1.20

F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B	.85
14 to 19%	1.20
19% min. B	1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over

No. 1	$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd

Ton lots (packed)	$1.46
Less ton lots (packed)	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

ELECTRICS
RE-NU-BILT-GUARANTEED

M-G SETS 3PH-60 CY.

Qu.	KW	Make	RPM	DC Volts	AC Volts
1	4800(3U)	GE	450	300	2300/4600
1	2400	GE	450	300	2300/4600
1	2000	GE	514	600	2300/4600
2	1750/2100	GE	514	250/300	2300/4600
1	1750	GE	514	600	2300/4600
1	1500	GE	720	600	6600/13200
1	1000	GE	720	275	2300/4160
1	1000	GE	900	260	4000/6600
1	1000	GE	900	600	2300/4160
1	500	GE	900	125/250	440
1	500(New)	GE	1200	300	2300
1	500	GE	900	250	2300/4160
1	350	GE	900	125	440/2300/4160
1	300	GE	1200	275	2300/4160
1	300	GE	1200	250	440/2300
1	250	GE	900	250	440/2300
1	240	Whse.	900	125	220/440
1	200	Whse	1200	550	2300
1	200	El.Mhy.	1200	250	2300/4600
1	150	GE	1200	275	2300
1	150	Whse.	1200	275	2300

D. C. MOTORS

Qu.	HP	Make	Type	Volts	RPM
1	3900(New)	GE	Enc. S.V.	475	320
1	3000(New)	Whse.	Enc. F.V.	525	600
2	2700	GE	Enc. S.V.	415	280
1	2250(New)	GE	Enc. S.V.	600	200/300
1	2200	GE	MCF	600	400/500
2	2000	GE	Enc. S.V.	350	230/350
2	1750	GE	Enc. S.V.	250	175/350
2	1500	Whse.	New	600	300/700
4	1500	Whse.	New	525	600
1	1300	GE	MCF	300	200/400
1	1200	GE	MCF	600	450/600
1	1000	Whse.		500	800/2000
4	1000	GM	D-8	600	600/900
2	900	GE	MCF	250	180/360
1	850	GE	MCF	250	85/170
1	750	GE	MCF	600	120/360
2	750	GE	MCF	600	450/900
2	645	SS		300	1000
4	600	Whse.		250	275/550
5	400	GM	D-8	250	300/900

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"PACKAGE DRIVES"
FOR ROLLING MILLS & REELS

(1)—3000-HP G.E. Motor, 90/180 R.P.M.
(1)—3000-KW Allis-Chalmers, 600-VDC, M-G Set, with 5000-HP Motor, 13800/6900/4160-Volt.

* * * *

(1)—1500 HP Westinghouse Motor, 300/700 R.P.M. and
(1)—1250-KW M-G Set, 600-VDC with 1750-HP Motor, 2300/4000-Volt.

* * * *

(1)—1400-HP G.E. Motor 165/300 R.P.M. and
(1)—1200-KW M-G Set, 250-VDC with 1750-HP Motor, 2300/4000-Volt.

* * * *

(2)—750-HP Westinghouse Motors, 300/700 R.P.M. and
(1)—3-unit M.G. Set—(2) 600-KW Generators and 1750-HP Motor, 2300/4000-Volt.

* * * *

(2)—235-HP Westinghouse Motors, 325/975 R.P.M.
(1)—500-KW Westinghouse M.G. Set, 250-VDC, with 700-HP Motor, 2300/4000-Volt OR
(1)—3-unit Westinghouse M.G. Set with (2) 250-KW Generators and 700-HP Motor, 2300/4000-Volt.

All M.G. Set Drive Motors are Synchronous, 3-phase, 60 cycle. Will sell any of these items separately.

Can furnish any type of Starting Equipment for the Synchronous Motors, necessary exciter sets and D.C. Motor Control.

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THE CLEARING HOUSE

Inquiries Fall Off In New York

Used machinery dealers in New York note that the rate of inquiries is off.

They say the Presidential election and the stock market sag are causing buyers to hold back.

■ Used machinery sales are slow in New York. Even the rate of inquiries, which has buoyed dealers' hopes for the last few months, is off.

Dealers give many reasons for the slump. The consensus is that it's a combination of factors making all buyers more cautious, and some even bearish.

Several dealers point out that the upcoming Presidential elections are influencing some buyers to hold back. Others note the recent sag in the stock market as contributing to the outlook of potential buyers.

However, one dealer says, "I've been in this business for 21 years, and I just can't tell you why business is bad."

More substantial reasoning includes: There is too much dormant capacity in too many factories in the area. "When a man can't keep all the machines he has busy he certainly doesn't run out and buy new ones," comments a dealer.

Less Subletting — Another suggested that there is less subcontracting on government contracts. "The big guys get the prime contracts from the government," he explained. "When things are humming they subcontract out a lot of the work. But when things are slow, like now, they do as much as they can themselves. That means less work for the small fabricators, and that means fewer used machines are needed."

Whatever the reason, most dealers have just about written off the rest of this year. Nevertheless, if things go along pretty much as they are now, the median dealer will probably do just a little less business in 1960 than he did in 1959.

Less Inquiries—One reason dealers aren't looking for any pickup this year is a lack of inquiries. Generally speaking, dealers point out that only a fraction of the inquiries they get result in a sale. And the time between the first look and closing a deal is usually about one month.

Mixed Reactions — Reaction to the attempts by the Machinery Dealers National Assn. to help members sell used equipment at the recent Machine Tool Exposition in Chicago was mixed. The MDNA put together a catalog, asking each member to list five pieces of available machinery, with complete facts and prices.

"We gave away a lot of these catalogs," comments one dealer. "But no one seems to want to discuss whether he made any sales or not."

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The IRON AGE

"Got a hard sell for you, Adkins!"

BAR TURNER

TYPE 8-RGF MEDART
Capacity 2½" to 8" Serial 1051
50 HP 220/440/3/60 Motor Drive
Miscellaneous Spare Parts and Cutter Heads

Condition Excellent In Stock

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28th St. & A.V.R.R. Pittsburgh 22, Pa.
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2765 PENOBSCOT BLDG. DETROIT, MICH.
WOodward 1-1894

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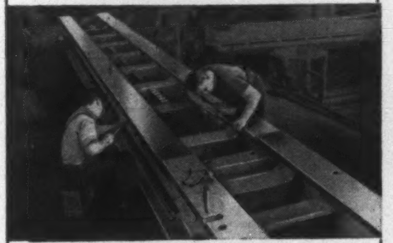
at its Best



Miles rebuilding often adds features not present in the original machine. Here Miles mechanics are preparing the bed of a 60 inch x 34 ft. Niles lathe to receive hardened steel wearing plates. The result is greater accuracy over a longer period of time.

Borer, Model 62 Ex-Cell-O inclined cylinder
Broach, 6 ton 30" st. Colonial hy. dy. vertical dual hyd.
Drill, Horiz. Natco 2 way, late (2)
Drill, Mult. No. 4BL Natco 36 spdl.
Drill, Radial, 5' arm 13" col. Cincinnati Bickford super service, Model 3E
Bulldozer, 180 ton Model 27 Williams & White
Grinder, Cylindrical, 18" x 36" Cincinnati Univ. hyd. Filmatic
Grinder, Internal, No. 47 Heald hyd. cross sliding headstock, late
Lathe, Automatic Gisholt, Simplimatic 15 HP MD. late
Lathe, Turret, 8½" Model 2H8 Libby, hy. dy. 20 HP MD
Lathe, Turret, 9¼" No. 4L Gisholt hy. dy.
Mills, Boring, 4" Universal Tri-Way horiz. (2)
Mill, No. 33 Model 1536 Sundstrand Rigidmil, Fluid-screw
Mill No. 5H K&T high speed dial type, plain
Mill, Thread, Model CT-36 Lees Bradner, late
Mills, Planer, 42" x 20" x 20' Ingersoll 20 HP MD
Mills, Continuous 72" swing Ingersoll 2 spdl. rotary
Press, 1000 ton No. 10C Ajax forging, air clutch, d.c.
Press, Horn 90 ton No. 75 Bliss Consolidated
Press, OBI, 75 ton No. 700B Perkins
Press, 60 ton No. 605 General Flexible
Saw, Cut-off, 3" No. 3 Modern
Saw, 10½" x 10½" Motch & Merryweather hyd. Cold saw late
Shaper, 28" G&E Industrial
Shaper, 66" Rockford hyd. openside hy. dy.
Shears, 38" throat New Doty No. 17F single end
Threader, Ex-Cell-O Model 35L thread grinder
Welder 200 KVA Federal air operated press type
Uncoiler, Cleveland cradle type MD hyd.
Grinder, Cyl. 10" x 24" Landis type CH Univ.
Grinder, Internal No. 72A5 Heald pl. univ.
Lathe, Engine 25" x 72" cc Axelson Model E hy. dy.

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ROLLING MILLS—STEEL WORKS EQUIPMENT

1—3-HIGH PLATE MILL 40" & 26½" x 112".
1—34" & 22" x 112" PLATE MILL, 3-high.
1—25" & 42" x 66" HOT STRIP MILL, 4-high.
1—3½" & 8½" x 5½" STRIP MILL, 4-high.
2—28" 3-HIGH ROLL STANDS.
1—18" 3-HIGH BAR MILL, single stand.
1—NEW 16" BAR MILL, 3-high, single stand.
1—10" BAR MILL with motor and gear drive.
1—9" BAR MILL 3-high five stands.
1—16" x 28" COLD MILL, 2-high, with 200 HP motor and gear drive.
1—34" x 192" ROLL GRINDER.
1—450 TON DOWN-CUT CROP SHEAR, 14" stroke, length of knives 28"
1—OPEN SIDE BAR SHEAR Williams & White No. 14½, 1¾" round.
1—SHEAR, 1" x 110" plate.
1—LEVELLER, 1" x 104" plates.
1—UP-COILER for non-ferrous strip, up to 90" wide.
1—ROLL LATHE, ENCLOSED HEADSTOCK, up to 40" dia. rolls.
1—MAGNETIC SEPARATOR double pulley, Stearns.
1—SIDE TRIMMER for non-ferrous sheets ¼" thick up to 100" wide
1—HALLDEN STRAIGHTENING and cutting-off machine, capacity 5/16" to ⅝" dia. x 14 ft.
1—POINTER, tube 2" O.D. x ¼" wall maximum.
1—1500 HP GEAR DRIVE, 7.5 to 1 ratio.
1—1200 HP GEAR DRIVE, 295 to 30 RPM.
1—1200 HP GEAR DRIVE, 353 to 94.5 RPM.
1—600 HP GEAR DRIVE, 1,698 to 1.
1—400 HP GEAR DRIVE, 8.2 to 1.
1—800 HP MOTOR, 2300 volts, 3 phase, 60 cycle, 293 RPM.
1—600 HP MOTOR, 2300/4600 volts, 3 phase, 60 cycle, 450 RPM.
1—400 HP MOTOR, 440 volts, 3 phase, 60 cycle, 450 RPM.
1—450 HP MOTOR, 2300/4600 volts, 3 phase, 60 cycle, 450 RPM.

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1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, George T. Hook, Chestnut & 56th Streets, Philadelphia 39, Pa.; Editor, George F. Sullivan, Chestnut & 56th Streets, Philadelphia 39, Pa.; Managing editor, Eugene C. Beaudet, Chestnut & 56th Streets, Philadelphia 39, Pa.; Business manager, None.

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5. The average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: 28,181.

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Sworn to and subscribed before me this 26th day of September, 1960.

PHILIP J. SHIRE, JR.

(My commission expires January 7, 1963)

[Seal]

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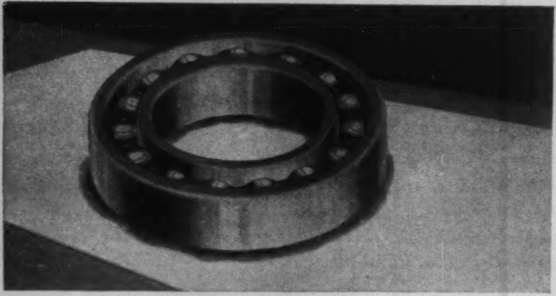

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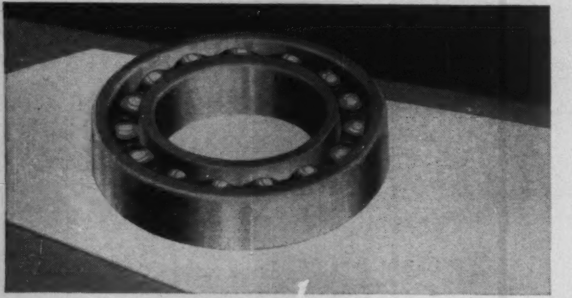

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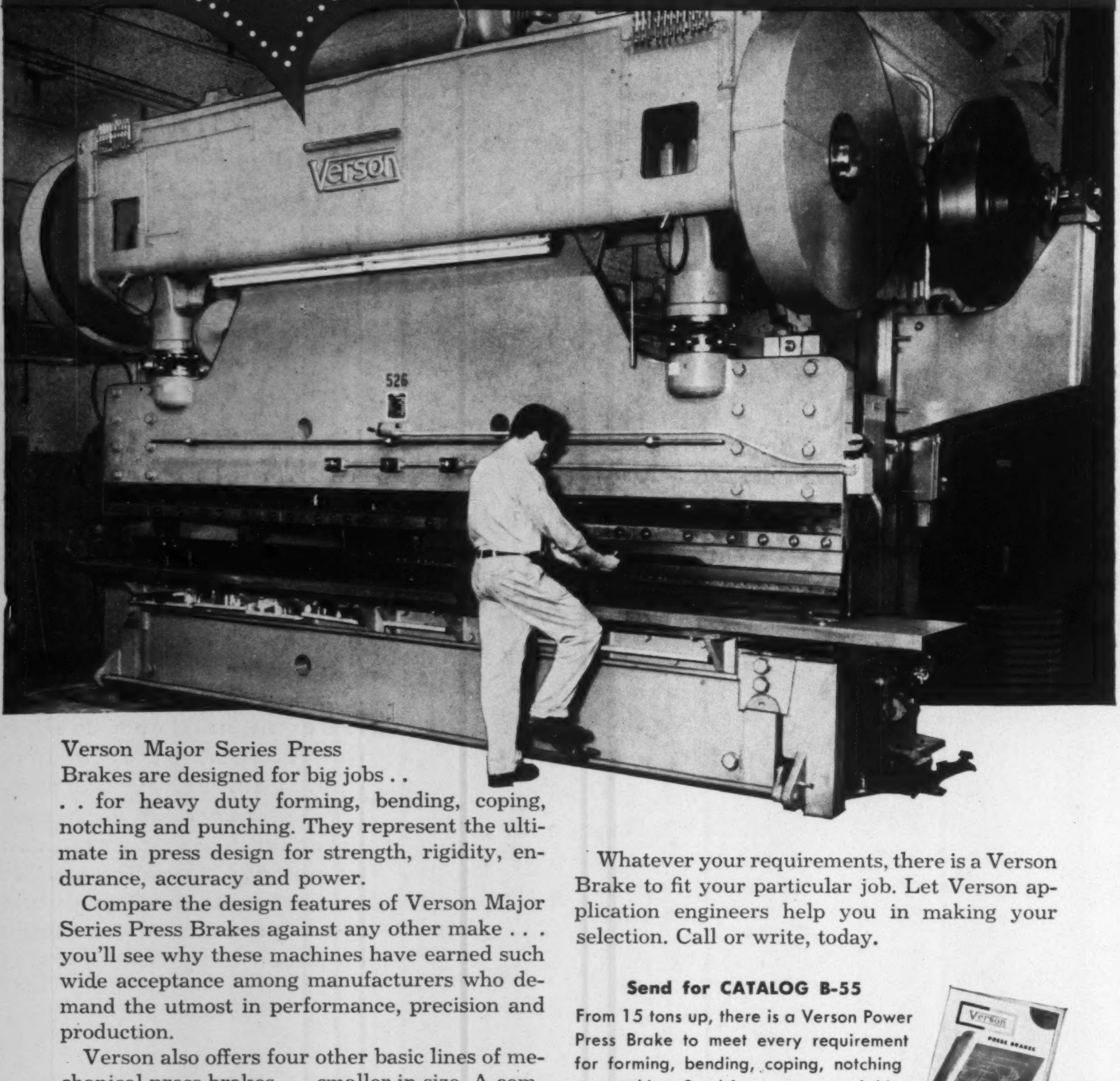

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